

Blender learning made easy

blender art

MAGAZINE

Creating Cartoony animation

Learning the BGE

Blender Game Networking

Case Study BRE

Animation



COVERART - 'Peach project gallery artwork'

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COVER ART

'Peach project gallery artwork'

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Sandra Gilbert
Managing Editor

I do not know about the rest of you, but watching the Peach team's progress has re-awakened a not very dormant desire to animate. Can you really blame me? Breathing life into a character is the ultimate in creative fun. Plus with "Big Buck Bunny" due to premier soon, now is a great time to study up on animation techniques.

Since animating is a broad discipline that covers far more than just getting your character from point "A" to point "B", it is often helpful to re-examine the basics as well as study more advanced techniques.

That being the case, we will not only be looking at the mechanics of motion (primarily arcs), but we will also explore Blender's various tools for tracking and visualizing those motions.

Additionally, we will be taking a look at facial animation and expressions, in addition to learning about phonemes and how they relate to lip syncing. Then, once your character is ready for his animation debut, you need to enroll him in acting lessons, with "Acting for Animation" by Clayton Mosseven, because even virtual actors need to act well.

We also have a special treat for you. Keith Lango has allowed us to include his article "Life After Pose to Pose" in this issue. I guarantee you will learn a

lot from his massive list of things to check/do when animating.

What are you waiting for? Get reading already.

Note: Several of this issue's articles make use of Shape Keys. If you have not yet explored Blender's Shape Keys or would just like to refresh your memory, here is a short list of tutorials and docs that cover Shape Keys:

- [BlenderWiki](#)
- [Blender 3D: Noob to Pro](#)
- [BSoD | Introduction to Character Animation/Shape Keys](#)
- [BlenderWiki/Driven Shape Keys](#)

Happy Blending!

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*A serious animation
really should have
voice actors*

You did the bouncing ball and mastered a box sliding across the floor as well as various other inanimate objects. Now you have moved up to character animation. Your walk cycles are progressing and you are starting to get the hang of timing, so now what? Well unless you plan to stick with the "Tom and Jerry" style animation where the characters never speak, next up is lip-syncing. Lip-syncing of course requires recorded dialog of some sort.

There are several options for getting recorded dialog. You can talk your friends and/or family into an impromptu recording session or you can use the services of "voice" actors. You can often find student actors willing to do "voice" work just for the practice or for very small fees. And of course you can hire professionals, it all depends on what your actual needs are.

A serious animation really should have voice actors, but a lot of times, if you are just practicing or creating a short little animation for fun, all you really need are some fast, easy and unique voices.

If that is the case, you might want to look into "Voice Changer" software. Often these programs are used for funny pranks and answering machine messages as well as for chatting online, but they can be rather useful to create unique voices for your characters. Depending on the program you choose, you can use a variety of preset "nick" voices as well as create unique voices of your own by adding various effects and adjusting the pitch, timbre and speed of the recording. Here is a short list of fun, easy to use programs I found.

MorphVox Pro: \$39.95, free trial - [Link](#)

Available free add-ons:

- Voice : Creatures of Darkness, Deep Space Voices, Fantasy Voices, Female Voices, Furry Voices for Sec-

ond Life, Galactic Voices, Male Voices, Personality Voices, Sci-Fi Voices, Translator Fun Voices

- Sound Effects : Ancient Weapon Sounds, Comic Sound Pack, Fantasy Sound Pack, Farm Animal Sounds, Sci-Fi 2 Sound Pack, Sci-Fi Sound Pack, Spooky Sounds
- Backgrounds: City Backgrounds, Nature Backgrounds, Voice Backgrounds
- Skins : Blue Satin Skin

MP3 Player Morpher: (free) - [Link](#)

- There are no preset 'nick voices" but they do have a few setting or mode choices for creating unique voices
- just remember to write down your settings if you want to use it again

Blaze Audio Voice Cloak Plus: 29.95, trial - [Link](#)

- Unlimited Presets - You customize, name, then activate with a click!
- 50 Fresh Sounds - Original Acousticons* that will rock your chat world!

Sayz Me - [Link](#)

- While not a voice changer as such, the semi mechanical quality of the voices, make for some great robotic/mechanical voices. If the Microsoft Voices don't appeal to you, they have a list of others that you can use with their engine.

Once you have your recorded dialog you need an easy way to help visualize the shapes needed for lip-syncing. There are some nice programs available to create time-sheets to sync animation to a pre-recorded audio track.

- It is similar to the commercial program Magpie.

Well now that you have all the tools needed to start your lip-syncing adventures, you might as well get started.

Yolo - [Link](#)

- Yolo is a Java program for creating time-sheets to sync animation to a prerecorded audio track. It is similar to Lost Marble's Papagayo.
- Yolo is written in Java, and should run under Windows, Linux and OS X.
- Yolo will automatically break the sentences into words, and the words into phonemes. It displays the results on the timeline:

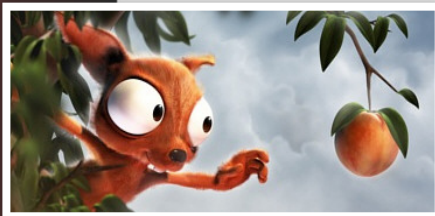
Papagayo - [Link](#)

- Papagayo is a lip-syncing program designed to help you line up phonemes (mouth shapes) with the actual recorded sound of actors speaking. Papagayo makes it easy to lip-sync animated characters by making the process very simple - just type in the words being spoken (or copy/paste them from the animation's script), then drag the words on top of the sound's waveform until they line up with the proper sounds.
- Papagayo is free to download and use. Sync 'till your virtual lips are sore! Papagayo is available for Windows, Mac OS X and Linux.

JLipSync - [Link](#)

- A Lip Sync program written in Java

Project Peach



The premiere date now is final and confirmed!

- Thursday April 10th, 2008
- Cinema Studio K, Amsterdam the Netherlands
- Premiere event

starts at 19.00, and includes dinner and party.

The premiere event has been made possible in collaboration with Creative Commons Netherlands (thanks guys!), which enables us to make this an unforgettable evening for Blender and for the open source and open content movement again. We will have a real 35mm film copy with digital sound this time! Thanks to sponsorship from our friendly neighbors at Filmmore we will even get three copies, sufficient for an efficient distribution to festivals worldwide.

The premiere evening will be accessible for everyone. However, if you want to be assured you can get a seat for the first screening you have to purchase a VIP ticket in our e-shop. The ticket costs only 30 Euro and includes a glass of champagne after the film, snacks and a meal, some free drinks, and first access to the party with a cool DJ. Not to mention early access to all the celebs!

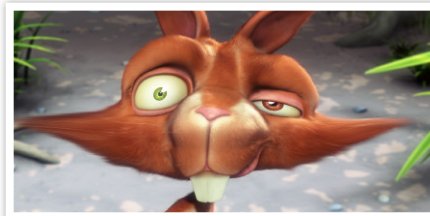
There is a maximum of 75 (of 150 total) tickets for sale, and first come is first served.

Big Buck Bunny Poster and Trailer

For those of you unable to wait for the premier, the Peach team has released a Trailer and a cool Poster and press kit to add to your collection.

Blender 2.46 (Peach Release) on the horizon

In preparation for the upcoming 2.46 release (dubbed the Peach Release), Blender RC1 "Rinky" has been released for testing. You can



grab a copy and test out all the new and exciting features and help our programmers track down bugs and glitches.

New features currently in SVN

[New Image File Browser](#)

[Skinning Improvements](#)

[Rendering Features \(FSA, Zmask, Cubic shading\)](#)

[Mesh Deform Modifier](#)

[Pole Target for IK](#)

[Glossy Reflection/Refraction](#)

[Raytraced Soft Shadows](#)

[QMC Sampling](#)

[Approximate Ambient Occlusion](#)

[Weight paint visualization and Multi Modifier](#)

[Render Baking and Normal Mapping](#)

[Particles and Strands](#)

[Constraint Improvements](#)

[Armature Drawing Improvements](#)

[Sequencer changes](#)

[UV Editing](#)

[Pose Libraries](#)

Open Movie project in Indonesia

Johan Tri Handoyo writes in from Indonesia about an exciting open movie project being developed there.

Hi blenderheads,

I just want to share some information about our recent OPEN MOVIE project with BlenderArt readers around the globe. My name is Johan Tri Handoyo, I am from Batam Island, Indonesia.



Some companions from my studio and I had planned this for a long time. About 1 year ago, we wanted to create some short movie or something similar with blender

At the same time, there was event for National Open Source Roadshow around March 2007 in Indonesia, and we thought that its just about the right timing, as our work will be watched nationally and we can introduce Blender3D more effectively to the audience in Indonesia.

Initially we had a minor setback due to lack of required skills in blender also the evident lack of human resources, so we had to postpone it, until now.

Work on the movie has begun and you can see the progress [here](#) (Sorry, the language is Indonesian only).

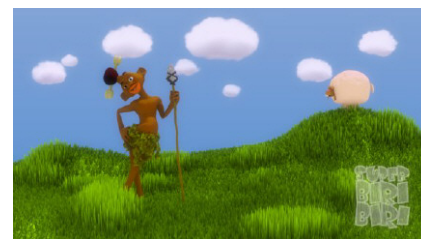
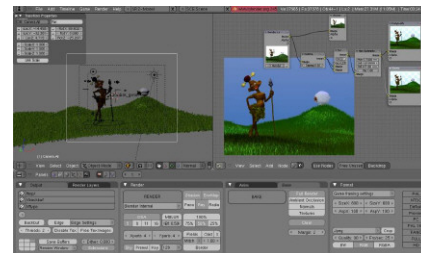
The title of the movie is SUPER BIRI-BIRI, biri-biri means lamb in English. So this is the story about a SUPER LAMB.



The setting or background is Papua, it was also known as Irianjaya, in our eastest province in Indonesia's archipelago. We wanted to create a story based on this area because of it's unique and rich culture values and very unique identity. The Papuaman (rig can be freely downloaded) probably looks alike an African man to you, but if you go through our progress on the link provided, you can easily figure out the differences between those two.



The model, rig and material are inside the papuaman.5.1.blend is in public domain, so you can use it for any purpose you want, just make sure to give us credit for it.



Sincerely yours,
Johan Tri Handoyo & friends.

So what's the Problem?

In my first animation tutorial that I wrote over three years ago, I outlined a fairly common (but under documented) methodology for managing one's keyframes in CG character animation. The point of that tutorial was never to declare that it was the only path to great animation, but was merely a suggestion for one way to approach your animation in a sensible, organized fashion that hearkened back to our traditional animation roots.

The thing that I always felt I never properly addressed was what to do after you hit the end of that lesson? What takes merely functional animation and elevates it to excellent animation? How does one get from good poses with fairly decent timing to a natural flow of performance that just draws the viewer in? In short, how do you go from OK to great?

Well, Smart Guy, How DO You Go From OK animation to Great animation?

Thinking about it at the time, I had to honestly admit that I didn't have all the answers to those kinds of questions. While I am in no way suggesting that I am great now (trust me, I'm NOT), I've gotten a lot clearer in my head about some of those answers.

Now here's a fairly bold statement, but I think it's true: For the most part, all pose to pose based animation will tend to feel the same. I've seen hundreds of animation tests from people who have adapted the p-2-p method for their own uses. While they all generally function, most feel about the same.

And when I looked at my own work I realized that a lot of my stuff had that same feel. Basically, I had stalled on "OK". I needed to go the next step to find that elusive unique voice for each character, to take my animation to

the next level beyond "OK" and start to approach some of the really excellent work I had come to admire over the years.

Thanks for the Personal Testimony, But You Didn't Answer the Question....

After a thorough analysis of my work up until that point, and then another analysis of the work that I admired, I started to note a trend. That trend basically boiled down to this: I didn't polish my work. I was happy enough to get it into shape, to get the major forms and timings figured out, but I hadn't taken the time to really work on all the little things that add to the quality of a piece.

After more cross reference and study and a fair amount of bouncing my work and experiments off of other animators who worked at top studios and picking their brains for feedback, I came up with a checklist. This Checklist consists of a number of various areas of the performance that I ask myself to examine in my work. Some of the questions I ask early on, while still thumbnailing my poses.

Other questions come much later in the game, after I think I'm done and happy with the work. But by far most of the questions are asked again and again as I develop the piece. The biggest advancements in my work come when I began to methodically go through my animation at various stages and ask myself about the items on my Checklist. These questions strike at the core of my work, forcing me to get my head out of the mere construction of a skeleton of the animation and into the realm of fleshing it out. Often the answer to these questions would require me to start over.

OK Sparky, So You Wanna Share Your Fancy-Dan Checklist?

For every motion, pose, timing and action on every character in your shot, you need to ask every one of the following questions. By going through the list one item at a time and cross checking every motion for the item, you'll find so many areas of weakness that need attention.

The struggle for many beginning animators is that they don't even know which questions to ask, much less how to answer them. Hopefully this list will help you to begin asking the right kinds of questions. It's helped me a ton. It's not exhaustive, but it goes a long way to spotting trouble before you save your file for the last time and think you're done. If only finding and implementing the answers was as easy as asking the questions.

Arcs:

Check to make sure your motions have good clean arcs. Turn on trajectories if your software supports them. If not, get out your dry erase marker and draw the arcs on your monitor.

- Wrists - you need to keep an eye on these to fight that marionette feel
- Elbows - if you're using IK arms, then you absolutely **MUST** check your elbow arcs
- Feet - track the heel & the toes to see if you're getting clean arcs on both
- Head - the most obvious motion hitches will show up in the head. It's usually a torso problem, it just shows up in the head arc
- Knees - watch for pops and skips
- Hips - the center of mass is vital to believable weight, so check the hip arcs.

- Ankles
- Props - so many times we forget that the prop the character is holding/using is as important to the motion as the character
- Eyes - when they turn, are they linear turns? If so, add some arc.
- Face (lipsync) - make sure your face doesn't linearly go from static morph target to target. The face needs to feel organic.
- Tails - way overlooked, and very tricky to get right.
- Check break downs and make them stronger if needed - weak arc? Push that breakdown pose.
- No two motions should have the same arcs - feels very unnatural. Weave the arc lines like a tapestry of interesting motion.
- Cross arcs and overlap for interest

Line of Action:

Make sure you're being strong with your lines. The difference between an OK pose and a great pose most often lies in the line.

- Have you pushed your line so it reads clearly?
- Is your line interesting?
- Is your line strongly concave or convex?
- When going from one pose to another can you invert your lines for stronger contrast?
- If all you had was one still frame to show for this pose, is your line of action capturing the kinetic energy of your character like a good illustration would?

KnowHow: 'Life After Pose to Pose: Taking Your Animation to the Next Level'

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by Keith Lango

Offsets:

Find a part to emphasize by scheduling it's late or early arrival. Offsets help keep things loose and let your character breathe, combating the common "pose-move-pose-move" feel of most Pose-to-Pose animation.

- Check for twins. Shifting one arm by a frame or two is not fundamentally addressing the issue of twinning. You need more than that.
- Does it fit for you to offset the hand from the elbow? The elbow from the shoulder?
- For this move should your arms lead the torso or do they follow it's weight?
- For this move should your hand lead the arm or follow it's weight?
- Does your upper torso move independently from your hips?
- For this move, should the head lead or follow?
- Have you seen if offsetting your rotation keys from the translation keys adds any life to the character? How about individual rotation channels from each other?
- Do your fingers each move independently from the other fingers?
- Should your fingers flow after the hand or stay tight to it?
- Is this the right place to use the offset (aka "pixar") blink?

Overlap & Follow-through:

What a LOT of pose-to-pose animation suffers from is the dreaded "hit & stick". You need to find a way to get that out of your animation while still keeping strong clear poses and clean timing.

- Are you overlapping too much? Is it too soft? (mushy)
- Are you not overlapping enough? Is it too hard? (sticky)
- Are your motions distracting? (poppy)
- Does it feel like your ease outs are too linear? (robotic)
- Will this move benefit from the successive breaking of joints?
- Do your body parts overlap with believable physics? Are the hands too slow (heavy) or too fast (light)?
- Don't blindly trust overlap or lag plug ins... check each frame for accuracy.

Energy:

One of your primary tasks as a character animator is to manage your tension, your energy build up and release. Each character will build & release their energy in a very different way. And even given different circumstances your character will build & release energy differently.

- Does the size of the anticipation match the speed of the subsequent action?
- Does your character flow well from one thing to another? Should they?
- Does your character's body language and gestures' energy match tone & energy of the dialogue?
- Look for ways to build texture into a shot - building across phrases and releasing. Not every pose or move is the same length.
- Move your character around on their feet to keep them believable. Nothing says "I'm not believable" like frozen feet.

KnowHow: 'Life After Pose to Pose: Taking Your Animation to the Next Level'

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by Keith Lango

- Does the energy of your character keep building up during a hold when appropriate? tip: if the pose hit didn't have an extreme with a recoil, but is rather meant to build energy for release (like an anticipation hold) then you'll keep growing the energy up into the pose, like a long ease into the extreme.
- Does the energy of your character keep settling with gravity during a hold when appropriate? tip: If the pose hit had a settle-back after an extreme, you'll generally want to keep the held energy settling into gravity.

Pace:

You need to keep things moving at a natural flow. If your shot feels dull, look at your pose holds and your transition timings. I'll bet you \$20 that all your holds are about the same length and all your pose transitions are about the same length.

- Are your motions too even across the shot?
- Are all the motions too fast?
- Are they too slow?
- Do you have an appropriate mix of fast moves versus slower ones?
- Be aware of the appropriate speed for a given set of appropriate actions.
- Mix up the pacing of motion. Fast flurries followed by long simmering holds. Great contrast.
- Don't make every move the same speed & flavor.
- Favor the anticipation or the breakdown or the ease out. Meaning: think what works best for a given action - slow in/fast out? Or fast in/slow out? Or even in/out but fast breakdown in the middle?
- What would character A move like compared to character B?

Silhouette:

Make your poses read in an instant, not in an hour.

- Do your poses read clearly in plain black & white?
- Funky lines in the silhouette? Check elbows to see if they're sticking out unnaturally.
- Check the spine & your line of action.
- Think of ways of compressing the pose/action into planes in space for cleaner reads. Perpendicular to the camera plane, or parallel to it. think Woody's "cool sheriff" walk from the cardboard box in Toy Story 2. Look at how his motion is compressed into a single easy to read plane that is parallel to the camera plane.

Motion Pathologies:

Does anything have a funky motion that just looks off?

- Check for IK pops
- Look for and fix hitches in the arcs
- Smooth out any hiccups in line of motion
- Destroy any and all distracting moves
- Do you overshoot on moves too much? Not enough?
- Is there enough "keep alive" on your moving holds? Is there too much so that you're adding noise to the signal?
- Clean out any and all distracting nasty geometry intersections. The small single frame ones in the middle of big moves, forget about those. Nobody will notice.

KnowHow: 'Life After Pose to Pose: Taking Your Animation to the Next Level'

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by Keith Lango

Timing:

...is everything. Well, almost everything.

- Do your character's gestures & actions lead words appropriately in dialog?
- Feel free to play with physics a bit to add some texture. Give some jump & hold to things in the air.
- A move should never be linear and it should never be even.
- Are your physics believable (weight)?
- Break up long holds with secondary action (scratching, wiping nose, weight shift, etc.)

Staging:

Can we see your action from the best possible angle? And remember, the ONLY view that matters is the camera view.

- For visually pleasing images compose on thirds
- Avoid staging your character directly down the middle unless you have a reason to.
- Use those lines of action to add visual angles to lead your viewer's eye where it needs to go.
- In production you must keep the integrity of the layout composition and then plus it with solid lines of action & silhouettes.
- If your character is doing something important, make sure we can stinkin' see what's going on!
- Track your eye as you watch. Where does it go? Is it where it should go? Do your eyes feel like they awkwardly jump from cut to cut? Is this the desired effect (sometimes it is)?

Acting:

Will we believe your character is sincere? Are they REAL???

- Stay true to character. Buzz Lightyear will not flail like a spaz like Woody would.
- Does acting match dialog intensity? Are you being too vaudeville?
- Do the hands & body merely illustrate words that your character is saying? How many times do you make a punching motion with your hands when you say the word "hit"? Not many. How many times do you make a kicking motion when you say the word "kick"? Not many. How many times do you spread your arms like an airplane when you say the word "fly"? Not often. Guess what? Neither should your character!
- Do the eye emotions match dialog?
- Reveal your character's inner thoughts or emotions beginning with the eyes first. Cascade out from there.
- Emotion drives motion. Motion does not illustrate emotion. (no vaudeville. See above note) Also, thought does not drive action - emotion drives action. Thoughts merely drive decisions, but decisions are not acted upon without the emotion to drive them.
- Avoid overacting. Keep it simple.
- Don't try to do too much in one shot. Less is more
- If your character's face needs to show an emotional shift, it's easier to read that shift while they are in a pose hold, not in a move. Emotional shifts should occur when the character is generally held still..
- Who owns the shot? Don't upstage the owner of the shot. Keep the secondary and background characters from being distracting with their motions. Sometimes breathing and blinking is enough.

- When the time comes to transfer shot ownership from character to character, make sure it's a clean hand off. Only one owner at a time. The audience should instinctively know who to watch based on what you show them.
- Maintain proper intensity levels appropriate for where character is on character arc. If your character has a major anger blow out in the third act, don't show that level of anger anywhere before that point.

That's A Lot to Check. Anything Else?

One simple discipline that I have found always helps me is this: About the time you think you're done with your shot, make a preview of your animation. Then, while it plays repeatedly, step away from the keyboard and grab a pencil & some note paper. Let the preview play over and over, until you start to see every frame.

Start taking notes of what needs to be fixed. Find EVERY single glitch, hitch and problem you can find and write it down to be fixed. Don't stop writing these things down until you've noted every issue you've spotted. Spend at least 5 minutes watching this shot loop over and over. Then, when you can't possibly find anything else to pick, go back to your file and fix everything on your check list.

So many times we think we're done before we're really done with a shot. This simple exercise will force you to stop and see the animation for what it is. By noting every problem, you're ensuring that you won't forget something. Then, when you've fixed every problem on your list, repeat the process again. Trust me, you WILL find more problems, stuff you didn't see before. It usually takes me about 3 or 4 times of doing this last pass, last gasp effort to really put the piece over the top.

Conclusion:

I hope this is useful to some of you out there. It may seem tedious and rather dull to have to comb over your shots like this, but that's the effort that's needed to take simply OK animation and push it to the next level. If this were easy or simple or fast, then everybody would be doing it.

But those who put in the effort to really push their shots the furthest they can go, they'll be the ones everybody looks at and wonders "Gee, what a lucky dog that he got into XYZ studios." Luck doesn't have much to do with success. Going beyond the simple application of a singular method and pushing yourself and your work to the highest level you can, that has a lot to do with success.

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Introduction

Lip syncing is the art of matching up your characters' mouth movements to a prerecorded dialog. Sounds pretty straightforward and easy, doesn't it? Well it is... kind of. Well okay, maybe it's not that easy, but it isn't as hard as you might think.

The first thing to remember is that written speech and spoken speech are NOT the same thing. If you try to lip sync your dialog literally as it is written, I can guarantee that your character will look de-

ranged with its mouth flapping all over the place trying to hit each letter. This concept is something that can't be stressed enough. When speaking (and ultimately animating) your mouth only moves for "key" sounds. These sounds are referred to as phonemes.

Phoneme sets can range anywhere from 3 to 4 shapes to well over a dozen, with the most common being 8 to 10 shapes. The set you choose will of course depend on your character design and style of animation. A simple character with only a few facial features could probably get away with 3 to 4 shapes, while a more realistically modeled character would benefit from the 8 to 10 shape sets.

We are going to cover an eight shape set. It contains enough shapes for most animation / lip syncing purposes.

Position 1:



- A closed mouth, lips normal width
- Used for the consonants M, B and P
- Variation: make lips slightly pursed for sounds following an "oo" sound, such as in the words; zoom, loop

Position 2:

- Mouth open, teeth closed
- Used for consonants C, D, G, K, N, R, S, TH, Y and Z
- Variation: slightly open the teeth for rapid dialog



Position 3:

- Mouth wide open, teeth open
- Used for vowels A and I



Position 4:

- Open mouth, teeth open a little
- Used mainly for vowel E, can also be used for C, K, or N when doing rapid dialog



by Sandra Gilbert

Positions 5:

- Mouth wide open, very round shape
- Used for the vowel O (as in the word go)
- If the sound follows falls at the end of a word, use position 6 immediately afterward to close the mouth



- Used to make F and U sounds
- For normal speech, this position is need for realism, but it can be replaced with position 2 for casual or rapid speech

These basic eight positions will take you a long way, but keep in mind that just using these eight shapes as listed is not enough. You need to slightly vary those shapes in addition to adding facial expressions and appropriate body language in order to create a convincing character animation.

Position 6:

- Mouth is pursed with a smaller opening than position 5
- Used for "oo" sounds such as food, brood, boo and also used for the vowel U



Applying these shapes to actual dialog is a whole other article, one that I haven't even started writing yet. In the meantime, here are a few articles and tutorials you can check out to get you started.

Links

[Blender 3D: Noob to Pro](#)

[Principles for Lipsync Animation](#)

[BSoD | Introduction to Character Animation](#)

Position 7:

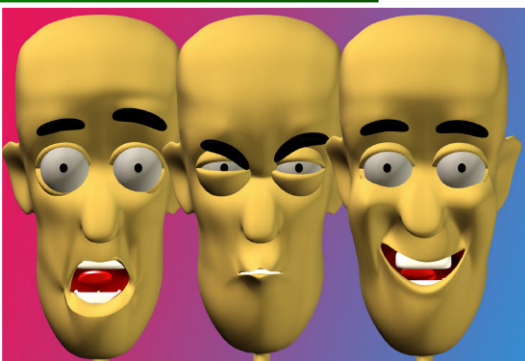
- Mouth is wide open, teeth parted and tongue up against the teeth
- Used mainly for the Letter L
- Also used for D or TH when following an A or I
- If dialog is rapid, you can replace this position with position 2



Position 8:

- Bottom lip is tucked under upper teeth





Introduction

Simple facial expressions can and will breathe life and personality into your character. You did give your character a face, right? What do you mean no? Well I can tell you, this won't be very effective if your character doesn't have a face.

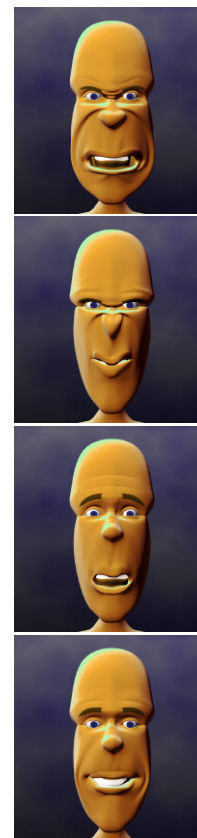
All kidding aside, not only do facial expressions add believability to your character, they are very easy to set up in blender using shape keys. Now there are two ways you can go about setting up a facial expression library.

- 1 Full Face Expressions: You can setup/create a shape keys for each expression you want to use. Blending between two or more shape keys will add variations to the Shape Keys you created.
- 2 Upper Face/ Lower Face Expressions: You can setup/create shape keys for individual facial elements (i.e. Eyes and eyebrows, mouth and lower jaw, etc.) This method allows for greater flexibility in creating expressions, as you can then combine any of the upper face Shape Keys with any of the lower face Shape Keys.

The method you use will, of course, depend entirely upon your character design and what you plan to do with your character. One thing to consider is whether or not you plan to do any lip syncing with your character. If the answer is yes, you will want the second method so that you can use the mouth shape keys for both lip syncing and facial expressions. Then all you would need to do is activate and use whatever extra elements (i.e. Eyes, eyebrows, nose twitches etc) that are needed to complete the expression.

Okay, now let's talk about the different facial expressions you might need for your character. Although there are six extreme expressions (anger, disgust, fear, joy, sadness and surprise), there are an unlimited number of variations. Let's take a look at the basic six first:

- **Anger:** The eyes are wide open with the eyebrows pulled down over the eyes. Although the mouth could be closed, it is usually open with tense, tight lips and teeth bared. The jaw position is dropped down.
- **Disgust:** The whole face is a picture of tightness with squinty eyes, the mouth is closed and pulled up toward the nose.
- **Fear:** The mouth is wide open with the lower corners pulled back. The lower jaw is dropped with the lower teeth showing. The eyes are wide and open.
- **Joy:** Open relaxed eyes and eyebrows. The mouth forms a smile with the corners pulled upwards, pushing the cheek muscles up.

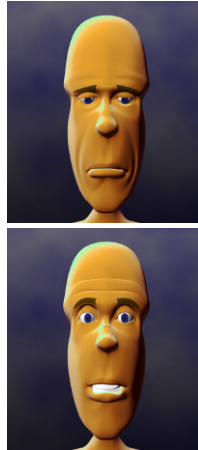


by Sandra Gilbert

KnowHow: 'Creating a Facial Expression Library'

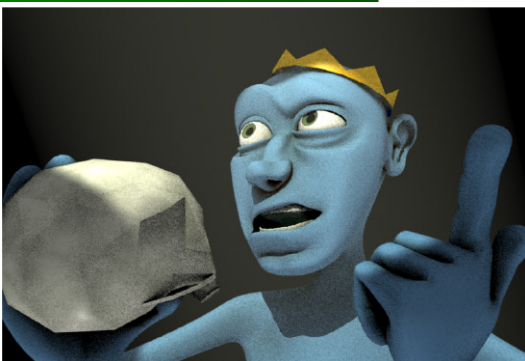
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- **Sadness:** The lower corners of the mouth are pulled down, possibly showing the lower teeth. The eyes are generally squinty and maybe completely closed if your character is crying.
- **Surprise:** Wide open eyes with raised eyebrows, but not so much that the forehead furrows or wrinkles up. The mouth and jaw are slack and relaxed.



These six expressions can go a long way towards furthering your character's believability, but you will want to experiment and practice creating as many expressions as possible. The more expressions your character can show, the more personality your character will have and that will allow your audience to connect with your character on a deeper level.

by Sandra Gilbert



Introduction

Acting... Animation... The two may sound mutually exclusive. "What does Animation have to do with Acting?" some of you may ask. I'd answer, "Everything!"

When Animation grew in the early half of the 20th century, Animators were keen to study the dynamics of human movement and emotion in order to convey a truthful performance of their characters that they had to draw. Naturally, references were

used to understand the intricate nature of form and movement. For example, rotoscoping techniques were used for the first animated feature 'Snow White' by Disney to give its lead character and some of the dwarves lifelike movement and emotions. As animators got better with conveying performances into each of the frames, they experimented with a variety of ways to heighten the impact of the action.

Nowadays the usage of Acting for Animation is not as widespread among the community, nor is it common knowledge as a practical tool for Animation. In an industry in which Motion Capture is seemingly simplifying the whole process of animating, despite some of it being smoothed out with a degree of keyframing, the art of Acting for Animation appears to be dying off to most except the elite production companies and animation purists.

It is said that Pixar won't employ animators unless they have an acting ability. One only needs to watch the performances of each character in their films to understand why. The [Animation Mentor courses](#) focus specifically on teaching animators acting techniques. Watching the acting performances from the demo-reel from each graduate

term will illustrate this quite clearly. Basically, animation in any feature or short is a highly refined truthful performance transferred from the animator to the character they are animating. Animators and actors are of the same ilk. An animator is, at the end of the day, an actor with a pencil. Or in the case of Blender, an actor with one hand on the mouse and the other on the keyboard...

So how do you apply a performance to your character?

I will point out that in order to understand Acting for Animation, you don't need to have an understanding of the Blender UI at all. It's irrelevant for this area of work. It is, however, JUST AS IMPORTANT to have this side of an animation figured out during the preproduction process as much as having a well made and rigged model with scene. In some ways it's just as important as the audio production of a film.

Both complement one another. Getting the acting right for your animation from the get-go usually allows for an animator to organically create their feature/short film purely from a performance aspect, rather than from the setting up of shots and lighting angle.

A digital character's performance and script will usually determine what is required to come after, shot and lighting wise, even if you do have a storyboard to guide you beforehand. Film-making is the antithesis of this, of course, because all shots and lighting requirements are figured out well in advance during preproduction. A performance can be discovered and refined constantly, so be flexible.

by Clayton Moss

So to break it down, we need to look firstly at the characters. Choose one character and write a background on them. Their history, favorite food, do they have any mannerisms, do they own a cat, their daily mood, etc... Go totally wild & creative in this area. The more background you can flesh out for each character, the more depth you give them.

Though their specifics will probably never be entirely explained and illustrated in the animation that you are working on, nuances to their final performance may glean to the audience that the character has a multi-faceted persona, just like any person in real life. That process creates INTERESTING characters with a REAL PERSONALITY.

Interesting characters make an animation re-watchable, again and again. They come from a place of knowing. Watch Shere-Khan from The Jungle Book or Captain Hook from Peter Pan and you'll see what I mean. Get inside the character and ask questions, "What do I want, Why do I want it?" Be the character, don't act it.

Once their personality has been solidified, its time to place them in a scenario. Never work on the whole film at once -- your script (and, if you're adventurous and well prepared, your storyboard) should guide you in all that. Break the film down into separate scenes and work on the whole performance in one scene at a time. So when you're analyzing a single scene you must understand where the character is coming from and where they are going.

The progress of the scene depends wholly on the actions that take place during it and the character's reactions to the drama & events created. The character must enter a scene in a particular mood, they must emote something, and they must show proper reaction whether it's the first scene or the last. Emotional continuity between scenes must remain at all times, otherwise the audience gets confused.

When performances in scenes have been finished, you can then work out the shots and lighting requirements.

Emotions are very complicated to convey, but there are a number of ways a character or person can emote. People can also 'act' in one way but feel another way. Contradictions like these are truthful and create interesting performances. There are two ways to best capture and transfer performances with your character. You can employ either a video camera or a full body mirror, both if possible.

Those who are more adept with animation can animate purely through their own imagination, sometimes just by manipulating bone IPO curves. However, for now we'll concentrate on the first two methods. This is the fun part, where you get to act! Taking on-board all the the characters personality aspects when you fleshed out their background, you then act out and perform the scene to yourself in front of the mirror or video camera AS THE CHARACTER.

Like I said, be the character, don't be shy. Close the door to your room if you don't want people watching you. Take note of everything you do performance-wise when you do the scene. Experiment with different ways your character may act and react in a scene.

Do it with a friend if you have more than one character present. If you are lucky to have both a mirror and video camera, you can place the camera on an angle so that you can record your front and back in the whole frame. This helps if you are doing a scene with a switching two-shot and you don't want to animate anything and everything.

Cut back and cheat if you have to, cheat like hell. All the top CG companies do it as well. At the end of the day, if it looks good and believable, who's going to really know if you also animated the facial expressions of a particular character if all you see of them in some shots is the back of their head??? ;)

As you transfer your performance to the character, make note of each part of the body and how it moves. You may need to do it a couple of times to know the flow of movement.

If your character doesn't move like it should because you have a poor rig, it'll create a lot of headaches, so make sure that is all correct and tested out rig-wise before you begin.

Emotions aren't just limited to facial expressions. The whole body moves with it too. Keith Lango describes the best way of encapsulating this excellently by the usage of 'Power Centers' (<http://www.keithlango.com/tutorials/old/powerCenter/powerCenter.htm>) A power center is where a character emphasizes their whole body at a particular focal point. Basically, a character's power center will convey where they are at with their personality and emotion.

A character with a power center in their chest may appear confident and strong, one with a power center in their hips may come off as being sexual, while another with their power center in front of them and down will appear sad and depressed. Power centers can emphasize masculine or feminine aspects of a character, their overall inner nature, or even a permanent injury they sustained recently or years ago. Find your character's power center and the performance should flow outward from there. Body language tells the story.

Motivation is a biggie. Everything we do in life is a reaction to an inner feeling and thought process. All thoughts are clearly illustrated in the face, especially in the eyes and forehead for animation. Picture that area as being a TV screen for allowing an audience member to see exactly what the character is thinking and feeling at any given moment.

Eyes can convey a wide variety of thought processes, looking off to the side and up can be seen as thinking in action. A performance, live or animation, is a series of moments given by changing thoughts and feelings. Nothing ever stays constant in this respect, it changes due to the continual inner responses toward the outer stimuli.

Animation must always be moving. Even during moments of thinking for a character, we must see the character think by ever so slight changes in the forehead, eyes and eyebrows. Everything must come internally from the character. Much like the power centers, inner thoughts and feelings should flow outward, to the lower half of the face, then the head, the body and its gestures afterwards, including the character's overall posture.

Inner thoughts and feelings affect and change the location of power centers to a new position. For example, a happy character enters a scene - His power center is in his chest as he struts in confidently. His face is happy, and his eyes are bright. Then another character in the scene tells him he has lost his job. The character responds by an inner thought process illustrated in his face.

From his forehead and eyes, we see that he becomes sad. This in turn spills downward whereby his head droops, moving further down, causing his power center to move from his chest to the ground in-front of him where he then hunches over toward it.

Soon he responds in any number of ways - by crying, putting his hands to his eyes, jerking to each sob he makes. And mind you, all that in a second or two. It isn't a long time, but it is a lot of action to convey in one character. Daunting, isn't it!

Animation acting must be believable. The audience must believe in the sincerity of the performance or you will lose them. 'Truthful' is a term actors like to use, but animation allows it to be stretched out in degrees. Exaggeration is used at varying levels. When animating a character's performance it must never be exactly how you did it in the mirror, there has to be an element of exaggeration applied to emphasize it.

A simple walk cycle, for example, calls on an animator to make the up-down motion of the body for every contact and passing pose slightly more prominent than it would appear in real life.

Facial expressions must be exaggerated more than in real life. If your character is made for it, it may even be squashed and stretched for exaggeration. Face, arms, legs, body, head -- Go bananas with the exaggeration! 'Telegraphing' is another method. It is also referred to as anticipation. In real life, if you were to punch somebody (purely for example sake of course, I don't condone violence) you would just throw your fist out to hit them.

But in animation, if a character was to make a punch, he would do a big pull back of the fist, hold it momentarily to express his anger, then punch. That recoil action is one example of telegraphing.

Another might be the double take, where a character sees something. But instead of just looking at it straight away with a reaction, he might glance at it and look away unperturbed in a split second, then look at it again but this time, a BIG REACTION. "Use big anticipation", as Marcel Marceau used to say. It basically tells the audience what is about to happen. Or in some cases like the Road Runner cartoons, the opposite can happen too, so be creative. :)

Subtlety plays a big part in animation. It is especially effective during the conveyance of inner thoughts and feelings. A slight shift in eyebrows during a reaction, or small shifts in the eye pupils to move very slightly side to side in an examination of the person or object they are interacting with. Everything moves all the time in animation, nothing is still, EVER! It must be alive 100% of the time.

A character must have moving holds when they are standing still. A moving hold is an ever so slight shift in the overall body positioning. The chest may also move up and down to breathing. Even secondary movement comes into play here. For example, as a character moves to pick up a ball, he extends his arm, whereby he stretches out and opens his hand, then he stretches out his fingers all the way out and then to the fingertips which are the last to move. Just like a pulse that travels

down train carriages, the first carriage moves to pull and each subsequent carriage is pulled in turn. It's a minor thing, but subtleties like the ones above can improve your animation a hundred fold.

Weight and size is another aspect of animation that needs to be conveyed clearly. A skinny character would be light and nimble on their feet while a fat character would plod along with heavy steps. A character's weight may also affect their persona. Usually fat characters are portrayed as dumb and slow, short characters usually have a big personality, skinny characters are weak and timid.

Then you have external objects. A large, heavy object would require an incredible amount of strength to lift it. Telegraph the moment before lifting to show the character straining with the weight and size of the object before they lift it off the ground. All objects have a degree of weight to them, so don't treat everything as being weightless. All objects have mass and are affected by gravity.

When framing a shot with the camera, it's a good idea to know where to focus your character's performance. In a wide shot where you can see the whole of your character, your character should move in its entirety. Expressions of the body should be a little bigger than normal, especially around the face. In a mid shot, where the body is seen from the waist up, the performance should be scaled back to as normal as possible.

Expressions of the face and body should be pretty regular but exaggerated to normal degree. The legs don't need to be animated because they are cut off from view. Like I said, cheat if you can. A close-up is usually shoulders and head only, so the body doesn't need to be animated. You might slightly shift the upper arm and shoulders, but any hand movement should be kept inside the camera frame.

The focus in a close-up is mainly on the face, and that is where you can play around with a variety of expressions and subtleties to a greater degree.

Please note that from here on in, lip-sync errors are very easily spotted if there are any, so clean it up if you can. The extreme close up, or ECU, is where you only see the face. This shot is to show inner thoughts, feelings and reactions to external stimuli. Make them clear and succinct.

So in conclusion, all acting in your animation performances should be believable, unambiguous and interesting. You should be able to watch it with the sound down and still know what the character is doing. All good acting should have that quality. Mime is the closest thing to animation acting, so see if you can watch a few videos on YouTube or DVD to get the gist of it. Research as many Warner Bros and Disney films as you can, especially the early ones, to know the dynamics of the acting for each of the characters.

But remember to watch them for the acting only. As I've only really touched upon acting at its most basic level, as complex as it may be, anyone who is serious about animation should take up acting and improvisation classes. I cannot stress it enough. Your animation skills will improve greatly.

Highly recommended reading supplements (in no particular order):

- 'The Animators Toolkit' by Richard Williams
- 'Acting for Animators' by Ed Hooks
- 'The Illusion of Life' by Frank Thomas & Ollie Johnston
- 'Advanced Animation' by Preston Blair
(<http://www.animationarchive.org/2006/05/media-preston-blairs-animation-first.html>)
- 'All kinds of stuff' - John K's Blogspot
(<http://johnkstuff.blogspot.com/>)

- Keith Lango Animation
(<http://www.keithlango.com/wordpress/index.php>)
- 'Introducing Character Animation with Blender' by Tony Mullen
- 'Acting in Film' by Michael Caine
- 'The Stanislavsky System' by Sonia Moore
- 'On Acting' by Sanford Meisner
- 'Impro' by Keith Johnstone
- 'About Acting' by Peter Barkworth
- 'Be a Mime' by Mark Stolzenberg
- 'Truth in Comedy' by Del Close

by Clayton Moss

Clayton Moss
Sydney



Clayton Moss is a professional actor from Sydney, Australia who has worked in a variety of Theatre Film & TV since 1999. He also works as a filmmaker/ animator.

Introduction

So you have started animating. You have figured out how to create poses and can set the start and end points of an action. Then you sit back and let the computer figure out the rest. Ta-da! Instant animation, or is it? OK, technically it is, but not a very good one. So how do you go from an "OK" animation to a great one? By going back to the basics of course.

Animation is all about movement, so it stands to reason that an animator needs not only to understand the mechanics of movement, but how to apply those mechanics effectively. One of the most basic movements in animation is the arc.

By simple observation of moving objects and people around you, you will discover that, with the exception of mechanical objects, everything moves in arcs and circular patterns. From the simple bouncing of a ball to the more complex movements of a character, arcs allow for more fluid movements, creating a smoother and more natural feel to your animation. Both physics and gravity play a role in creating the arc. When an object is thrown, gravity pulls the object into a parabolic or arc-like trajectory, while physics regulates the arced movements of the human body caused by rotating joints and the pull of muscles.

So while good 3D software can create a fairly consistent movement from point "A" to point "B", it generally also creates a boring one, that, depending on the speed of movement from point "A" to "B", could very well flatten or distort your arc, creating an unnatural looking action. A more natural looking action can be achieved by moving from "A" to "C" to "B", with "C" being between the start and end points (but not in a direct line), creating an arc.

When animating a character, most of us realize that arms and legs follow obvious arcs due to the rotating nature of the joints involved, but a common mistake is to not incorporate arcs in the rest of the body's movements. Everything on the body follows arcs, including the head and eyes. For example, when animating a simple head turn, setting keys at the start and end position of the turn will result in a flat, unnatural linear movement. But if in the middle of the turn you set a key for the head tilted either slightly up (or down), you will end up with a far more natural, fluid-looking movement.

Even when you remember to use arcs as you go about setting your poses, it is all too easy to lose track of the arc (often resulting in jerky, sloppy movements). Fortunately, Blender provides some very easy methods for tracking your arcs as well as visualizing how your animation is progressing.

One of the first places to look when you suspect that your arcs have wandered, is the IPO window. Your IPO's should look smooth and flow nicely from key to key and pose to pose. If you see little spikes or bumps (or on occasion big spikes or bumps that you did not set yourself) in your IPO curves, that is an area that needs attention.

IPO Keys can be easier for some to manipulate and adjust than the standard animation curve. In the IPO window, go to Ipo Curve Editor View Show Keys. By switching the Ipo Editor from curves to keys, two very useful things happen:

The Ipo Curve Editor now draws vertical lines through all the points of all the visible curves (curves are now shown in black). Points with the same 'frame' value are linked through the vertical lines. The vertical lines (the "Ipo Keys") can be selected, moved or duplicated, just like the points. You can only translate the keys horizontally.

- The object is not only shown in the 3D View in its current position but 'ghost' objects are also shown at all the key positions. On some video displays, you may have to press K in the 3D View window. In addition to now being able to visualize the key positions of the object, you can also modify them in the 3D View. For example, you can move the selected Ipo Keys.

Showing the ghosts of past and present keyed positions is an often overlooked feature that can be of great help in checking and tracking your arcs as well as general positioning of your object. The location of the object at the current frame is shown as a green line in the IPO Window, and as the object in the 3D View. The keyframe selected in the IPO Window is shown in yellow, as is the outline of the object in the 3D View, further helping you visualize the animation. All other keyframed ghost locations are shown as a black outline in the 3D View.

For checking a character's poses as actions linked to time, you can use the following options in the Armature Visualizations panel (available while in Pose mode) to view the paths your armature is set to take (also know as ghosting or onion skinning):

** Ghost: Shows a transparent 'ghost' of the armature "N" frames behind and over the current time. This only works when you have an action linked to the armature.

* Step: The frame interval between ghost instances.

This is a valuable tool/option for monitoring and maintaining nice clean arcs in your movements.

These options have been around for a while and useful as they are, the coders have added even more functionality into the upcoming 2.46 ('Peach' project) release. For a look at the new functions and options, check out Armature Drawing Improvements at blender.org

There is a wealth of information on the web concerning the importance of arcs in animation. One of my favorites was written by Keith Lango, "Arc D' Triumph!". While you are there, check some of his other tutorials. You will be glad you did.

Mechanics of Movement

- Arcs: due to physics and gravity, all things in nature move along arcs and or circular patterns.
- Anticipation: used at the start of an action, often used to cue the viewer to the fact that something is about to happen. Most often seen as movement in the opposite direction as the upcoming action.
- Overshoot: used at the end of an action, nothing in nature comes to a sudden and dead stop, the action should move past the stopping point of the action and then settle back into the pose.
- Secondary action: these are composed of the little wiggles, twitches and quirks that add life and personality.
- Follow-through: when parts of the body or object keep moving after the main part of the body comes to a stop.
- Overlap: not all actions should start and stop at the same time, parts of the actions should overlap each other.
- Moving holds: when it is necessary to hold a pose for any reason, you should still have some minor/slight movement occurring, such as a shifting of weight, breathing or blinking, otherwise it will look like the the whole animation just froze up.

Modeling and rigging characters is a time consuming task, one that takes a lot of practice and study to get just right, and while most of us will get there eventually, it is nice to be able to just grab a ready made character for study. Whether to study the design and rigging itself or for further study of animation techniques and tests of said information. And there is always the "just for fun" factor to be considered too. Following is a list of fun characters and rigs built and contributed by various members of the blender community for your study and enjoyment.

1) **BlenRig 1.2** created by Juan Pablo Bouza

BlenRig is a humanoid rig for Blender 2.44 (or higher) based on bones deformation. The main purpose of this project is to make a rig that is "shapekey free". I've developed a somewhat complex skeleton system based on different types of constraints in order to achieve realistic deformation even in the most extreme poses. In addition to this, BlenRig comes with a complete facial animation system rig.

There are two different rigs (BlenRig 1.2 and Cartoon BlenRig v1.2) available, as well as a BlenRig manual and BlenRig Essential Tips document. Version 2.0 due to be released April/May

I'm planning to release BlenRig 2.0 along with a short film I'm currently working on. All I have to say is that there will be some really nice surprises when it comes out... Well, I've done a little video showing up what BlenRig 2.0 will be introducing.

English

<http://youtube.com/watch?v=abWSMjXGnt8>

<http://video.google.es/videoplay?doc...52544709134401>
(download the IPOD version for higher definition)

Spanish

<http://youtube.com/watch?v=gl3qNxYV75s>

2) **Bunny Character** created by Woodman5k

He is rigged for animation, with an emphasis placed on facial animation and controls.

3) **CuteBear 0.03** created by Tommy Gard Helgevoid (JoOngle)

Fully poseable 3d character. In order to position feet properly, grab the constraint in FRONT of the foot with your mouse (and G), and ensure you have the whole screen to move the pointer around, this will ensure full flexibility of the IK chain. Arms move naturally around his body and have new limits

and new stiffness values, some "hack's" were done in order to bypass the original intended (logical) IK functions ...in order to make it look more natural. (nit-picking..you know).

3) **Impressive rigs with actions** available created by TheSudahlah

The rigs include a humanoid figure, a 4 legged dog creature and a 6 legged robotic insect. Each character has a series of actions including walk cycles, running, fighting, jumping, etc. So you can mix and match the actions, blending them to create your own animation. You can see the included actions on :

<http://www.youtube.com/user/yagapayanata> or download at : <http://uploader.polorix.net/files/235/looping.mov>

4) [Leg Rig](#) by Daniel Martinez Lara

A simple but great leg rig. It uses very few handles (only around 2-3) without compromising the functionality even the slightest. Daniel also did a quick little demo video that shows how the rig enables quick rearrangement of the pivot point of the foot/leg.

5) [Ludwig: Character and Rig v1.0](#) created by Jason Pierce

Ludwig is a fully rigged and animation ready character for Blender. His features include IK/FK arms, stretch and squash head and spine, and a lip sync ready face controlled by a custom UI. Ludwig was created to provide the Blender community with a high-quality humanoid rig and to promote Blender as a character animation tool.

6) [Mancandy Collection](#) created by Bassam Kurdali

Star of popularly acclaimed "Mancandy FAQs" dvd. A fully rigged and ready to animate character. All 3 versions of Mancandy are available for download and study.

7) [Mouse Rig](#): by Clean3D

Clean3D has created a fun little rigged character to experiment with.

8) [Otto](#): by Virgilio Vasconcelos

Otto is based on the techniques demonstrated at the Blender conference. One of the most impressive stretch rigs out there. Includes facial controls.

9) [Petunia Robot](#): by macouno

Petunia the little monkey robot was created for use in the 2007 Blender Conference Suzanne Awards.

Petunia is fully rigged and instructions are available on how to use and animate him.

10) [Richie the Gecko](#) by Jonathan Lax

Gecko Animation Limited would like to present the Richie Gecko Rig as a download for the Blender community! It is a fun and simple rig that includes blend shapes for the animation of Richie's facial expressions. In addition, this blend file contains the compositing node setup used for the post-processing of the animation.

11) [Red-Nelb .04](#) by Daniel Martinez Lara

Currently version 0.4, that means: 1) it's not ready for production. 2) Its missing some standard features like Fk in Arm/Leg (currently IK), stretchy, etc..

A complete rebuild of Arms and Legs is in the works. So, use at your own Risk!

"Red-Nelb" is a excuse to test and implement rigging concepts, in this version the focus is to use the minimum of controls in the viewport without losing functionality.

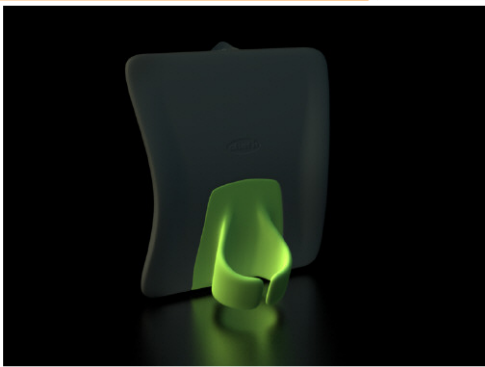
12) [Rigged Character: "Suzanne"](#) by Michael Thoenes

Rigged Blender Character based on Blender's Suzanne Monkey Head Primitive Object (or is that primate object?)

13) [Squeek](#) by Wim Claes

A little bird-like creature, to learn the basics of blender animation tools.

So there you go, a nice little library of fully rigged characters to play with to your hearts content. Why are you still sitting there? Go get them!



Introduction

Exploring a design or possible surfaces is the most important part in Industrial Design during the creative phase. Ideally you would like to use a tool which allows mass-modifications without remodeling already finished parts.

However not every program offers this. Some CAD programs round edges on-the-fly as a so-called feature, or change the lofted surface when the curves are modified, which are used for skinning.

The same also applies to working with model creation in Blender. How do you optimize your work when creating some new design. Unfortunately Blender does not have an interactive modeling tree - for example, like Amapi Pro - however Blender has some nice layers.

Layers can be used as a storage space for different steps. You can create a first draft in a layer, then duplicate it to another layer to refine it. On each major step of your modeling process, you may copy your model to another layer. This way you can always come back to a former shape if things go wrong. This can also be used when specific elements are finished.

This means layers are used like an explorational utility. During any time of the modeling when a specific problem is encountered you could quickly jump back to the model stage of one layer and restart there. Or you could combine the result of different stages into a new form.

I also personally find this workflow very useful when working with SDS (Subdivision Surfaces), which is mainly what I do. The problem with SDS in Blender is that you cannot locally subdivide the surface to model in details. It is important that when beginning to model you have a

rough understanding of the required mesh density required to build specific surface details. Sometimes during the initial steps you will quickly encounter problems with your mesh and can make, in the preliminary stage of modeling, quick adjustments to it.

For example, while modeling the Chef'n carrot knife I tried to figure out the minimum required density for getting the basic surface details, like the rounded quality of all edges as well as the curvature of the main body. Following this I was exploring the required mesh density to model in details like the finger holder and the geometry for holding the cutting blade.

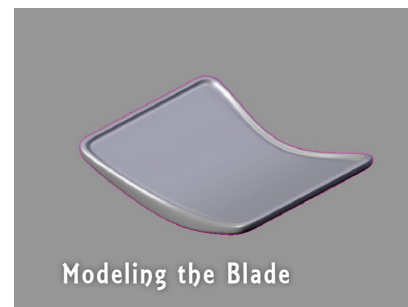
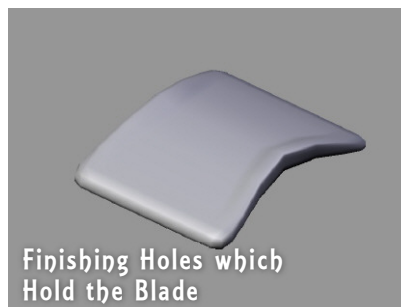
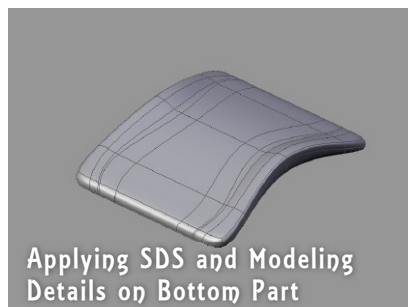
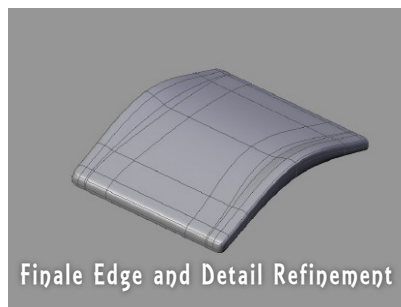
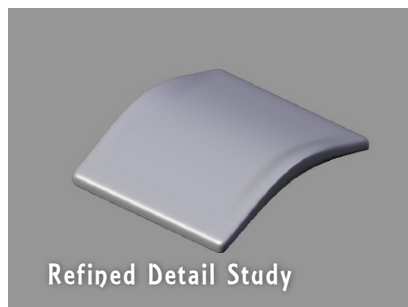
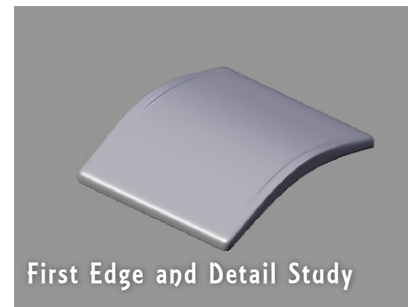
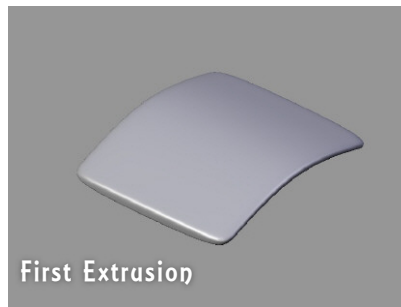
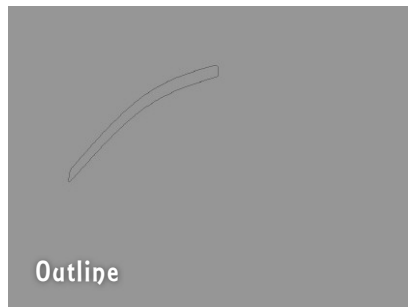
Bake SDS levels for further detailed refinement:

The last step in particular was difficult because as mentioned with SDS you cannot locally subdivide a surface to build such details. To tackle this problem I baked a level one subdivision into a more dense base mesh. This level was fine enough for my desired details. From there I continued modeling.

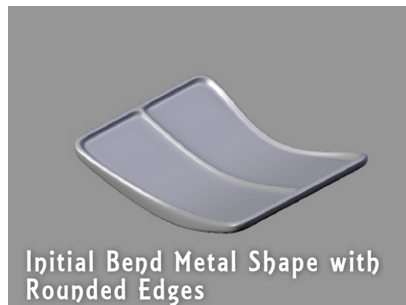
If you look into the different layers you see that I started with a general cross-section profile, extruded it, capped the edges and then pushed in the sides and extruded the tops to build those raised parts.

After that the hand part was explored, starting with a ring extruded into a cylinder, and a side view curve helped me to model out the curvature. At this point I needed to figure out an elegant face flow to get good mesh quality but also capture the actual details of that kitchen utility.

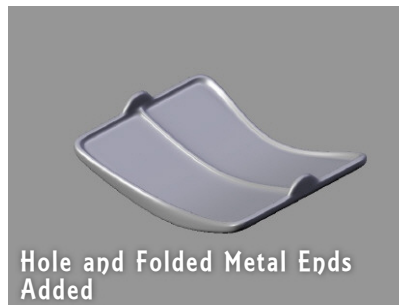
This approach of roughing out a basic shape with SDS, baking the modifier and then continuing to model from that point does not allow for quick stepbacks, however as mentioned the layers can be very useful in this case to store different design steps. This minimizes the amount of rework.



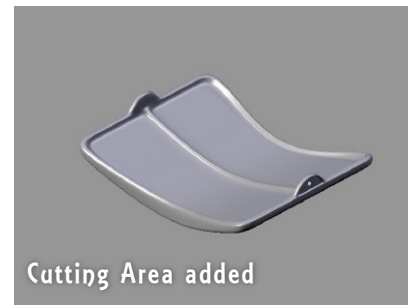
by Claas Eicke Kuhnen



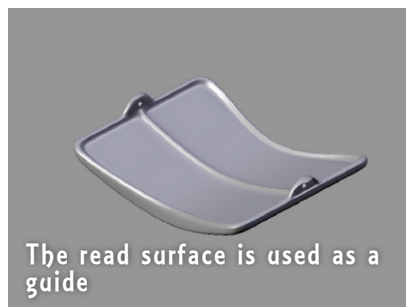
Initial Bend Metal Shape with Rounded Edges



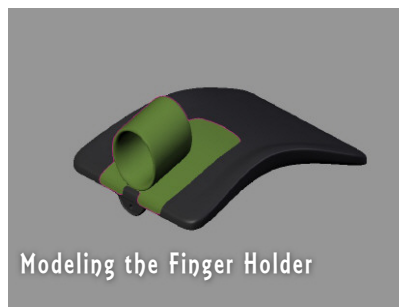
Hole and Folded Metal Ends Added



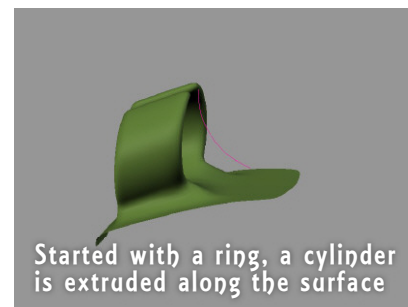
Cutting Area added



The read surface is used as a guide



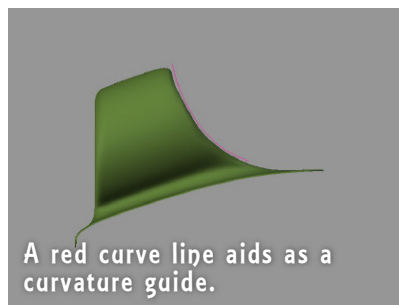
Modeling the Finger Holder



Started with a ring, a cylinder is extruded along the surface



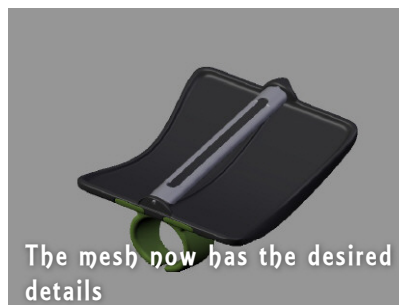
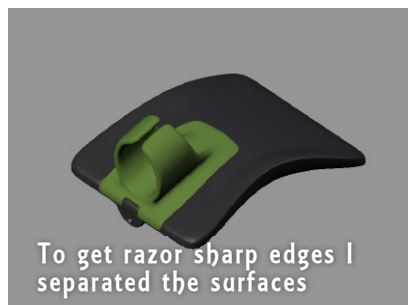
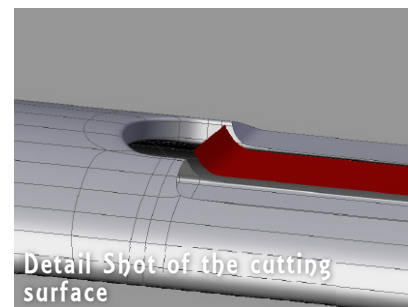
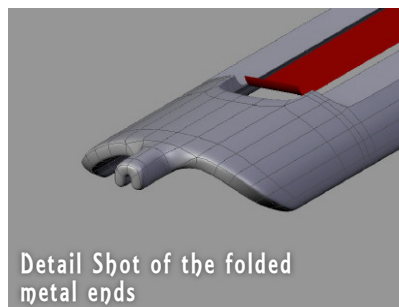
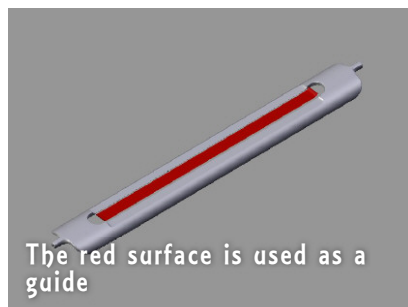
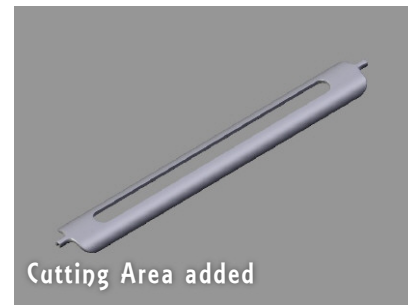
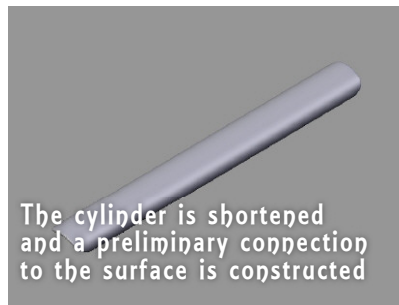
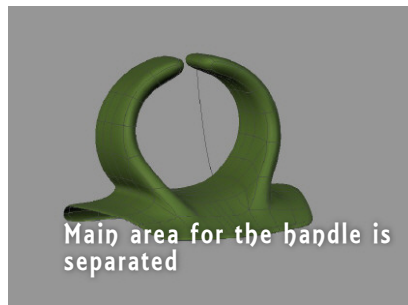
The cylinder is shortened and a preliminary connection to the surface is constructed



A red curve line aids as a curvature guide.

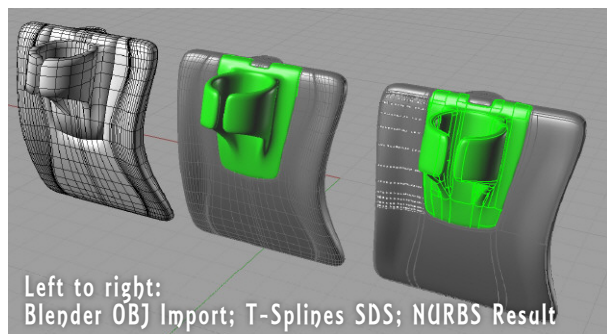


by Claas Eicke Kubnen



by Claas Eicke Kubnen

A mesh view showing the smooth transition between the finger element and base surface. There are no bad edges or unwanted surface flows, and few triangles are used to get the face network. In addition, the outline edges are extruded slightly downwards to make the part look separate when placed into the main model.



The result is a quite accurate representation of the actual Chef'n product, with a modeling time of around three hours. The finger holder required the most attention, and is the most interesting element and best example for using SDS for product modeling.

Specific elements like the holes or blade are more qualified to be done entirely in Rhino - however, for rendering purposes I modeled them inside Blender.

Claas Eicke Kuhnert
USA



Assistant Professor Industrial Design
Digital Fabrication Technologies
Kendall College of Art and Design
of Ferris State University

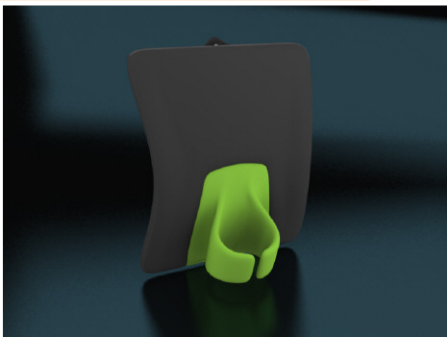
MFA 3D Studio Jewelry/Metal
Bowling Green State University, USA
Focus in Functional Metal Art and 3D Digital Art

Dipl. Des. (Fh) Color - Advanced Color
Concepts HAWK University of Applied
Science and Art, Germany Focus on Functional
Graphic and Product Design

Blender is my main modeling program for organic shapes with subdivided surface and for fast renderings. It's workflow is fast and allows me to quickly explore design variations. Moreover can it be used for rapid prototyping through importing the mesh into Rhino and converting it there to NURBS patches using T-Splines.

It is an accepted addition to the digital modeling class here at the Kendall College and is currently evaluated for digital rendering.

www.ckbrd.de | info@ckbrd.de



by Claas Eicke Kubnen

Introduction

As important as it is to explore design ideas quickly through modeling it is just as important to do the same with visual representations.

In Industrial Design, the rendering aspect is treated as an additional service. It is not as important as the actual manufactured product. In addition there are also opinions which state that good renderings are rather counter productive because the customer might bond with the rendered image instead of what the real product would be later.

This means that quick but good solutions are very welcome in Industrial Design. This is one reason why Hyper-shot is becoming very popular lately.

I believe however, that with skill and experience, quality hand crafted renderings can be also done quickly.

Hour long renderings are not the best approach of choice in an environment in which time counts. And Blender has some nice "speed up" tricks.

The biggest problem faced was to convince non-Blender users about the powerful render tools Blender has. Those include the material and compositor node system, render layers and passes, and of course the different render approaches reaching from simple lamp set ups to using radiosity and ambient occlusion.

The goal is to reach decent results quick. This means well illuminated products - showing realistic material simulation - and additionally, photography elements like Depth of Field effects for enhanced realism.

Blender comes with a rich set of light types including spot, sun, and area lamps, as well as ambient occlusion and vertex color based Radiosity. No MTL, Photon Map-

ping, Final Gathering, or Pathtracing is yet included, thus effects like caustics and local indirect illumination are quite difficult to generate in Blender depending on the scene. However with the current tool set we can achieve quite impressive results. Some are fast and easy to use and some are more labor intensive and take longer.

Highlight, mid tones, dark areas and shadows are visual elements we can employ to give a flat rendering the illusion of 3d dimensionality. This means we can follow nature or simplify this and apply them in a rather graphical and illustrational way.

This in other words means that we can do naturally looking images with even illumination or generate specific studies which focus on elements of the visualized product. That could be a highlight study or utilizing hard contrasts between highlight and shadow to emphasise the three dimensionality of the surface. For those steps we can select specific render types.

Ambient Occlusion for example produces a more even, a more natural illumination while when using only few spot lights we can increase the light drama inside a rendering and focus on contours of the object.

Traditional lamp rigs first::

At the beginning of CG there was no Global Illumination of any kind. The artist needed to simulate direct and indirect illumination through placing numerous lamps to brighten up shadow areas and color surfaces to fake color bleeding. Those so called lamp rigs were often very time consuming and complex to work with - simply because of the amount of lights you were dealing with.

Two of those set-ups which mimic indirect illumination are still very common today.

1. SkyDome

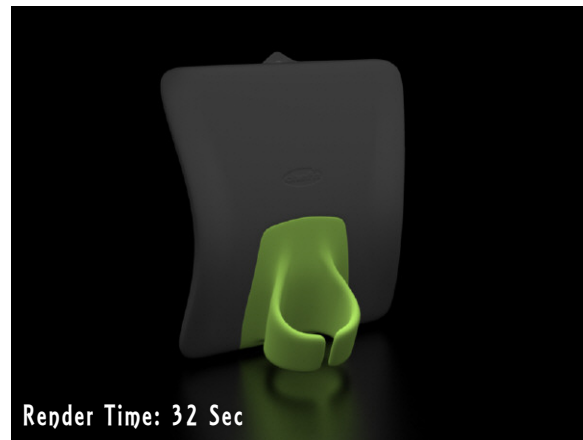
You dupliver a lamp over half of a sphere and let the lamps illuminate the object in the center evenly - in a way similar to what ambient occlusion does. The skydome mimics the sky which emits light from all directions. The more lamps used the finer the result - in particular when shadows are employed as well. However, the rendering will take longer also.

In contrast to older versions, Blender now offers raytraced soft shadows. We can use those instead of buffered shadow spot lights and get more realistic natural shadows. But again the more lamps - the more shadows - the longer the rendering.

In studio photography hard shadows, are in most cases, not a desired result. Soft lights are preferred because they enhance the perception of volumes. Hard shadows can be very distractive. In this case we could even ignore them. The trick with the skydome is to have a soft illumination which also mimics very light, soft shadows or self-shadowing of an object.

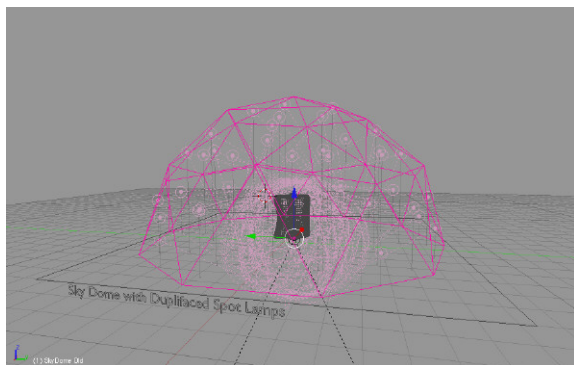
To hide the lack of any shadow we could also put our product on a perfectly reflective surface. When using duplifaces

the base mesh for the dome is not being rendered by default and thus the background will be visible. The reflective ground plate will then only show the reflection of our desired product. This would reproduce a good studio environment.



Simple Skydome Setup:

- Upper Half of one Icosphere / or Mesh of any shape
- Spot light parented to Icosphere
- Icosphere has "duplifaces" activated
- Spot light's energy is reduced to a low value
- Ground plate with shadow catcher (material/shaders/only shadow button) or surface with blurred reflections
- World with black background
- Optional fill light to brighten up lower part of object

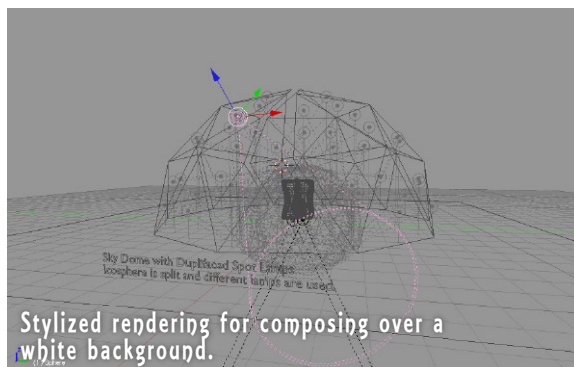


The skydome approach can be more refined.

To take natural color of the sky into consideration we can split the icosphere into two parts. Apply to each part a different lamp and give those two lamps different color and energy values. The sun side has more energy and more yellow, while the opposite side has less energy and is rather blueish to represent the light coming from the sky.

With the sun like lamps having more energy, the possible shadows will be much stronger. When using raytraced shadows, it is advisable to use higher values for the shadow sample to produce softer looking results. However this can quickly increase the required rendertime as well.

The light emitted from the sun being so far away can be treated as parallel light and thus could be use a single additional Sun light to cast the soft shadow. It can also be a spot-light. If your skydome is quite small, you might want to increase the size of the dome to also illuminate the ground accordingly. If you use a shadow catcher as the surface, the product will be much easier to compose into any print media.

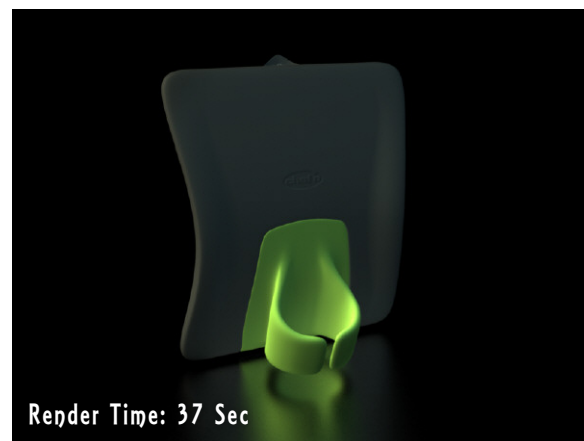


Rendering showing natural color illumination over reflective surface. An area light filler was used to brighten up the



Render Time: 1Min 32 Sec

darker lower part. The lamp color is using a blend between sun color and sky color.



Render Time: 37 Sec

This trick can also be used to simulate different light temperatures in a studio set. rotating the skydome and thus also rotating the color emission you can decide where the sun would be in your scene. Along with this you need to move

the possible shadow casting lamp as well.

In addition the dome does not always have to be a sphere. It could be any kind of mesh type.

With this the user has even more control on lights position and energy/color setup.

This should enable you to quickly build a set of studio-like lighting setups for your future productions.

2. Seven Lamp Light Rigs:

This follows the similar approach to what the skydome tries to achieve. You use 6 lamps for a general global illumination. Left, right, front, back, top, and bottom. Those represent the six geographical directions we have. One lamp should be the sun lamp while the rest cover sky, horizon, and ground. Those lamps can be orientated strictly along a vertical horizontal path or depending on the sun's position be rotated.

Because only 6 lamps are used the amount of light energy used must be higher than with the skydome lamps. The result is again an even illuminated object with less lamps being used. (therefore saving rendering time) Spotlights or area lights can be used. Spotlights enable you to use buffered shadows which render quite fast. This will not only illuminate, but will also provide natural shadows to the scene. However with only 6 lamps simulating natural shadows might be difficult.

A seventh lamp can be used to place harder shadows and stronger illuminated areas to focus attention to specific parts of the mesh. I would not use two accent lamps with shadows because that could start becoming rather distractive.

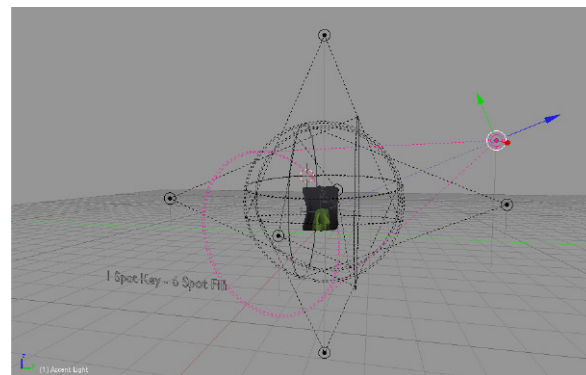
This setup is good for a fast light rig creation. playing with the lamp energy setting and color you can quickly simulate

an in-door as well as out-door situation plus give the object the desired dimensional feeling.

Because we only use 6 lights for the main task of lighting the scene, we can also create harder contrasts compared to skydome. This is an aesthetic tool which can be quite handy. The seventh lamp can be used to significantly let one area or detail pop out of the image.

Simple Lamp Light Rig Setup:

- 6 Lights coming from all 6 geographical directions facing the model
- 1 or 2 additional accent lights for casting harder, more pronounced shadows
- World with black background
- Optional: Ground plane with shadow catcher or surface with blurred reflections



As you can see the shadow is well pronounced - also pay attention to the yellow color from the left and blue tones from the top. They are modeling nicely the contour of the tool. The lamp below the object functions as our light bouncer off of the ground - evenly illuminating the lower section as well.



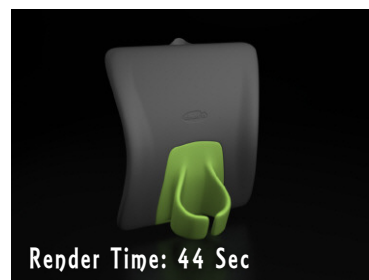
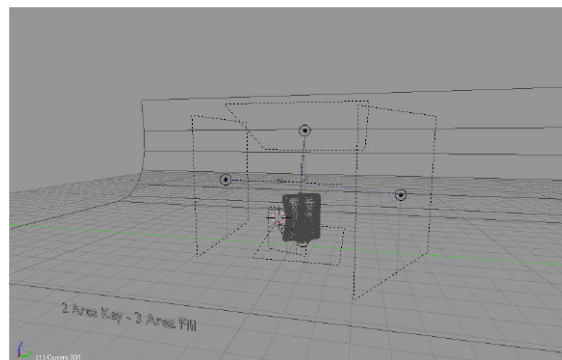
3. Area Light Rig:

Area lights produce useful light emitting surfaces and thus also produce the diffused light quality of a light box. With a few area lights we can quickly setup a well working studio utilizing light boxes commonly found in photography.

All that is needed is a left and right area light emitting the main amount of light. Here you can decide if you want to pronounce left and right evenly or if you want the left side to be more illuminated, which is, in my case, the situation. The top area light evenly illuminates the top contour while the ground light brightens up the lower part of the model. There is 4 smaller area lights which are moved very close to the model. Because the main area lights are rather left and right there is not much light coming from the front - the place where the camera man would be. We cannot use bouncing cards in Blender because it does not support Global Illumination this way. Thus we need a filler. That small light has the purpose of slightly brightening up the top part of the finger holder to prevent dark areas which might be also visible though unpleasantly looking banding.

Simple Area Light Rig Setup:

- 2 Lights left and right emitting most energy
- 1 Light top putting emphasis on top contour
- 1 Light below brightening up darker bottom part of model
- 1 smaller Light filling front part - removing banding
- 1 or 2 additional accent lights for casting harder, more pronounced shadows
- World with black background
- Ground plane surface with blurred reflections



4. Simple Area Light Rig Setup with AAO:

- 1 Light at a side emitting main energy
- 1 Light top putting emphasis on top contour
- AAO with a low energy value to brighten up scene evenly
- World with black background
- Ground plane surface with blurred reflections

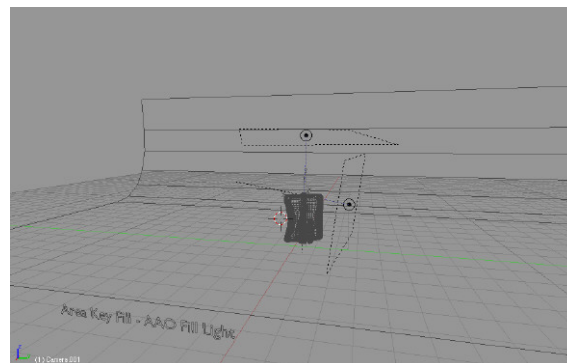
This setup only utilizes two accent area lights with a small amount of energy and a medium value for Approximate Ambient Occlusion. AAO will function as the main illumination model to brighten up the scene evenly while the area light energy is being added to the model to put focus on the model curvature.

AAO is our newest addition - the result is a grain free occlusion compared to it's raytraced counterpart and thus also quite quicker compared to high sampled raytraced AO. However it behaves a little bit different. Depending on the mesh size you might get strong blotches of shadows. To control those you can make use of the "Distance" function to prevent them. This will scale down the shadow size between facing mesh parts.

Depending on where you place the area lights you can have more illuminated or more surfaces in shadow. The result with this rig has a little bit more dramatic contrast. Shadows in general are



more pronounced. This is very visible in mesh parts which are close to each other.



5 Radiosity Solver:

Ambient occlusion has one major disadvantage - it works globally and not locally. It is great to be used in specific scenes where there is not a strong change in illumination like an outdoor scene. Another disadvantage is - in its current stage it does not support color bleeding.

Blender actually has one tool that can do exactly that. The Radiosity Solver is a quite dusty tool in Blender - not too much used any more. It is a little cumbersome to use - however with some practice, quite excellent results can be achieved.

The way the solver works is by calculating emitted and reflected light and storing this in a texture, the so-called light map. This map is then used instead of lights to render the scene. Light is sent from meshes and not actual lamps.

When you place a normal light inside a scene and its light rays touch an object, that light energy and color information

is being used with mesh surface shader information to on-the-fly render something illuminated and visible or in shadow and invisible.

This means no light - nothing visible.

The light map works differently. Instead of calculating the illumination of the sphere during render time, the Radiosity Solver renders the scene and bakes that result onto the mesh. Upon rendering the scene, Blender does not have to shoot out rays to see what is illuminated or what not - it simply uses the light map texture and shows it.

That's all. The downside is that this technique is vertex based. The mesh will be subdivided during solving time to be fine enough to store the light map results with a desired quality. This means your mesh is getting messy. You have to apply a subsurface modifier before solving time. All meshes will be joined into one result. This means after the solving is finished, you have to separate your meshes again and remove materials added by this process.

The biggest downside is that afterwards you cannot animate your objects because the light texture is static. Shadows will stay and not move with the object.

However for still renderings this is not a problem. This technique is also very nice to illuminate interior rooms when products are placed in it - very useful when your product has reflective surfaces. One of the nice parts is that the results are quite decent and once the solving is done, it does not have to be repeated again. Renderings are very fast. You can tweak your textures and instantly render your scene. That is the main advantage of a baked GI solution.

With the Radiosity Solver you can also give meshes a light emitting value, custom building complete light shapes not possible with any other technique. As a bonus this technique also calculates color bleeding in addition to bouncing.

In my case I built a typical scene, a backdrop onto which the product is placed. Everything is inside a box. The box simu-

lates a room for rendering, while at the same time functions as a bouncer for light rays. It is important that you have walls - otherwise emitted light will travel to infinity and you cannot achieve an indirect illumination. The front face of the box is removed to look into the room while it can be removed after solving time.

Technically speaking, the radiosity system is an illumination technique using no lights during render time. Lights are used only during solving time. This brings with it one small problem. Material effects like bump mapping interact with actual lights. This means using a bump map would be impossible with Radiosity. You simply will not see that texture.

However a workaround is similar to AAO using Radiosity as a global light solver while the accents are done with real lights. In my case I use area lights similar in size to the mesh lights for final rendering. The Radiosity makes everything nicely soft, while lamps take care of the bump mapping and in addition add extra crispness to the rendering.

Because of this situation did I use mesh lights with a low emitting value. Their outcome will be enhanced with the area lights. You could also use stronger mesh light values and use only the specular of the area lights and not their diffuse. This way the area lights will only create the bump texture without any added light.

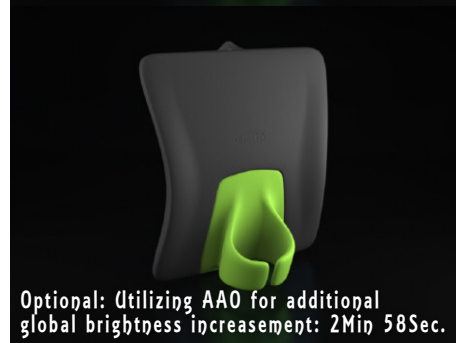
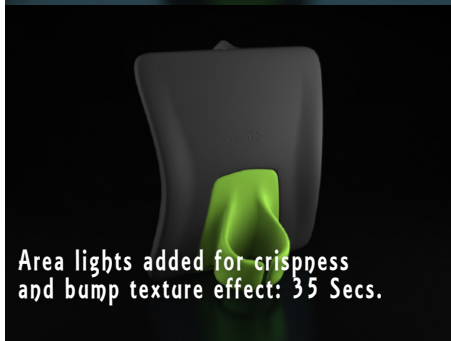
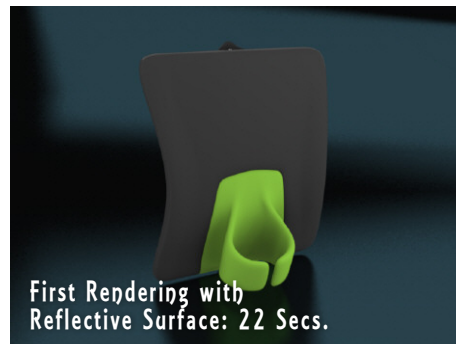
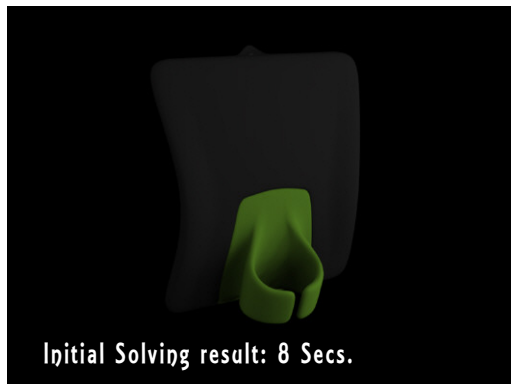
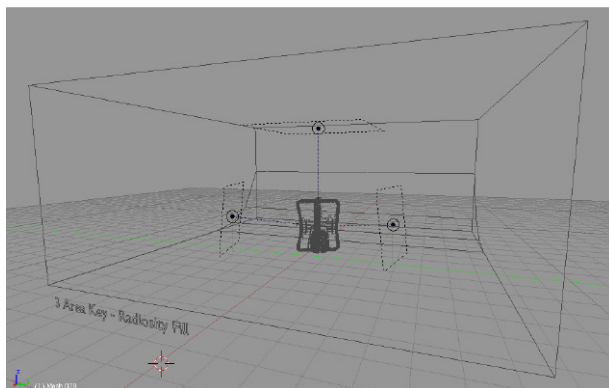
Radiosity Setup:

For Solving

- 2 Key Mesh Lights at a side emitting main energy
- 1 Top Mesh Light emphasis on top contour
- World with black background
- Ground plane surface

For Rendering

- 3 Area lights replacing the Mesh Lights
- World with black background
- Ground plane surface with blurred reflections



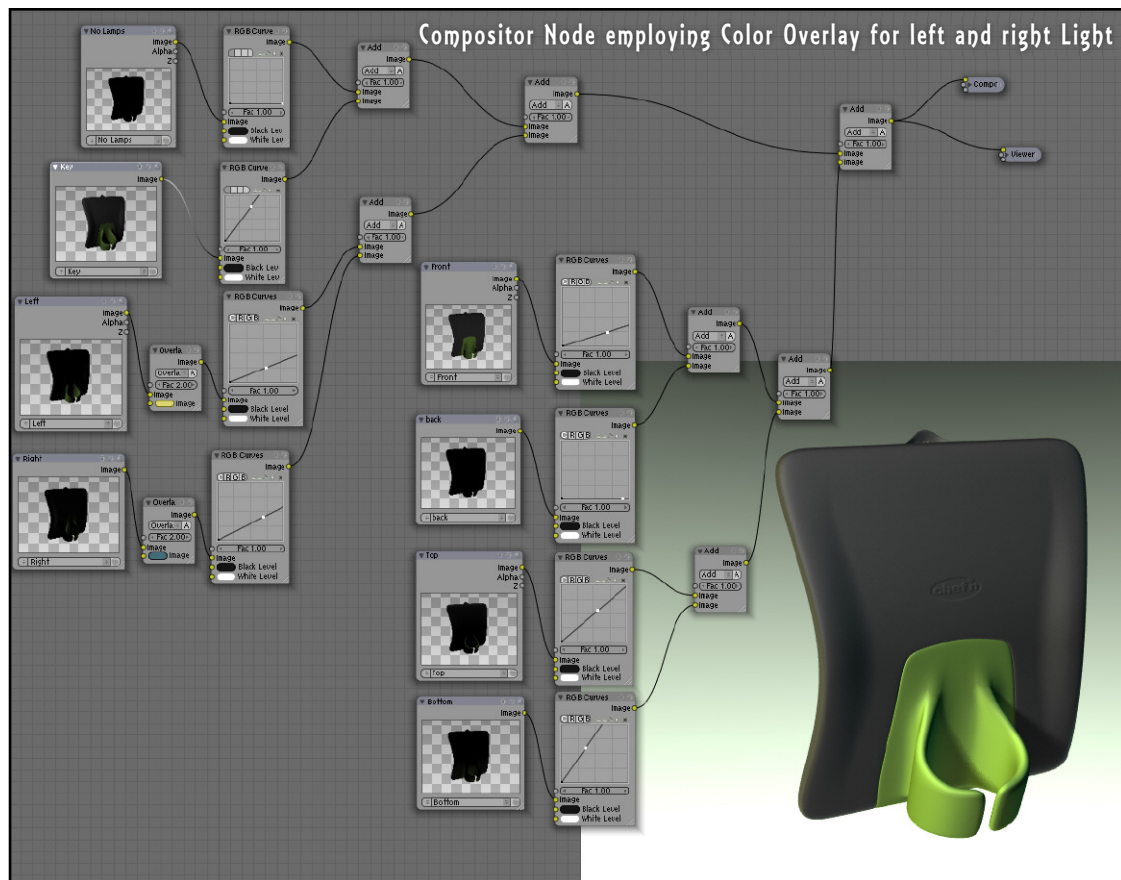
by Claas Eicke Kuhnen

Post-Production:

Lets assume one rendering takes a lot of time or rendering an image multiple times and comparing the results is not the most convenient approach. Blender offers a nice solution to this problem.

Using the Compositor with Nodes, we can render the scene multiple times. Each rendering would be a different lamp with the object. Those result can be mixed together in the compositor node. Through utilizing the "RGB Curve" we can turn each lamp on or off. With an input color, we could even color a lamp after rendering. All we need to do now is play with the curves until the desired result is achieved. This is a very quick and instant way to explore rendering.

You can give all lamps the energy value of 1 - through the RGB Curve we can lower or increase the amount of energy afterwards. Also simply give the lamp a white color since we can change that color with the use of an RGB input node. The RGB Curve can be used as a linear tool or similar to Pho-



by Claas Eicke Kubnen

Other nice utilities would be the Defocus node for Depth of Field and making use of render passes like a shadow, diffuse, specular pass and save those into separate image files. In Photoshop they can be modified elements added or removed and then composed together into a final rendering.

Small problems in rendering are more efficiently removed in a paint program than redoing the rendering.

Of course is it desirable to do good renderings in the first place. But sometimes you have to fake it.

And isn't CG all about faking any way :)



Light more from the right

Left more yellowish
right slightly blueish

by Claas Eicke Kubnen



by Olivier Dressen

Introduction

My artist name is Olivier Dressen aka "hero"; I am a Belgian artist/director, and I recently used Blender for some professional productions. For this work I've been contacted by a very cool french studio based in Paris. www.lap-loche.com

I was very proud when they asked me to make an animation to represent their studio around the world.

They asked me to animate their character in a free conceptual animation. At first I made some new character designs and conceptual drawings.

I would have a special mix with «stylish» character design and realistic background. For this job I've chosen 3D for the creation of the background, because I would have a lot of liberty for the directing of the different camera movements, especially for the intro with the very big zoom across space and into the futuristic town of Paris. I've used Blender for modeling some props, such as the satellite and one wall for the end of the clip. I utilised some pass-renders with different kinds of futuristic buildings, and used them in my different 2D matte painting.

At the end, I used these 2D backgrounds in my final 3D compositing. In the final phase of the production, I used compositing for cloud, motion blur, camera shake and mixed the 2D and 3D elements.

After the animation work was over, they added all the video media in Paris. They produced a very cool DVD for distribution to all their clients in Paris and abroad.

They actually work for very cool clients such as EMI records, Universal, Gorillaz, Digitalism etc.

<http://www.design-hero.com/press/blender/laploche.zip>



Mud Flow

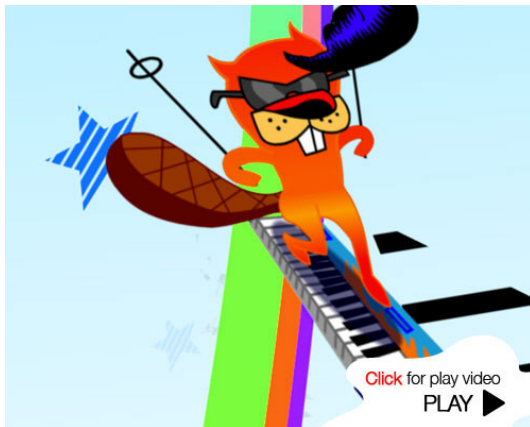
A Belgium Band «Mud Flow» asked me to create a test for their future video clip. At first I proposed a lot of illustrations, conceptual sketches and different character designs. Then we decided to make a small animation test to have a better idea of the final render.

Here we just used Blender for creating and animating the 3D car. At the beginning, I wanted to learn 3D for modelling of vehicles, because of the difficulty of animating car and geometric shapes in 2D. Ronan Zeegers, my friend, an artistic partner, modeled this car with my model sheet and turnaround. He gave me the UV map, and I did the texturing.

He animated the car at the end and sent me some renders with alpha for my final compositing. I also animated the car at the end, into the compositing. We really enjoyed the final render of this shot.

And we were so sad because they didn't use this concept after all. They were very happy with this test, but the final cost of an animated clip was too expensive.

<http://www.design-hero.com/press/blender/mudflow.zip>



40.be TV show

I had a very short time allowance for this production, and the client gave me the all freedom for the artistic direction. They had no graphical stuff for their TV show, and they asked me to do everything.

Logo, graphical chart, Generique, and all the background for the show were made by me. I had only three days to create all the graphic and animated stuff. It was very hard to do in such a short amount of time. First, I wanted to use Blender for modelling the Logo of this TV show. For this logo, I took inspiration from the screen design of TF1.

I used a 2D heart with chips inside because we love them in Belgium ! ;) The theme of the TV show was the 40 best video clips made in Belgium. In the middle of the production, I decided to build all the backgrounds in 3D and also all the 2D/3D compositing in order to have the greatest amount of freedom in the directing. Finally, I used a compositing software for the post production and FX. I really enjoyed this job, especially the Elvis beaver.

<http://www.design-hero.com/press/blender/40.zip>



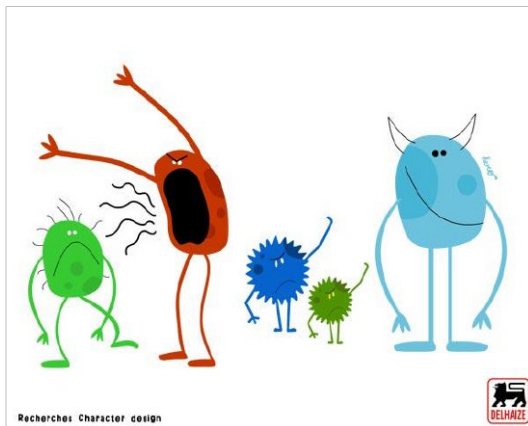
Smirnoff test

For this latest job I worked with Ronan again for MIB production. We entered a competition for a Greek advertising of Smirnoff. We created a lot of designs, and conceptual sketches to realise this final animation.

Ronan did all the creative research for the 3D parts, and I was focusing on the 2D renders, character design, conceptual drawings and layout. Ronan designed some original 3D plants, and he made the «lunar» background with the 3D camera motion.

We completed it very quickly, approximately in two days. At the end, I mixed everything with the 2D plant animation in the compositing software.

<http://www.design-hero.com/press/blender/smirnoff.zip>



Delhaize Advertising

Here, the client asked me to create an animation in flash style. I worked with Ronan Zeegers for this job again. He supervised the animation, modelling, rigging and all the 3D's technical problems.

Then the client approved my character design, and asked me to animate 30 characters in 2D in only one week... I was under pressure at that time. Ronan suggested that I should make all the characters in 3D with Blender, in order to animate them very quickly, and to keep freedom in modifications.

We didn't tell the client we had worked in 3D, to not stress them. When they were satisfied by the job, we told them the truth. They were really surprised and very amused with the smart using of 3D.

But we were a bit disappointed about this job because of the final artistic direction. We preferred the first character design we had used in our first animation test, and finally the artistic direction chose a more classical character design.

But the final render was very funny, and a lot of people who have seen the clip on TV were amused.

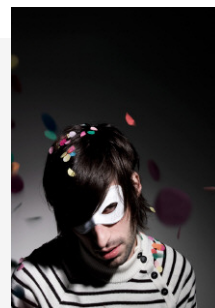
<http://www.design-hero.com/press/blender/delhaize.zip>

Olivier Dessen

Hero is an independent artist in motion design. He works for the movie industry, TV, bands, and commercial advertising. One time as Director, Art director, character designer, animator, illustrator,compositing, web-design, storyboard...

Hero is full of creative concepts and originality. His inspiration comes from memories childhood, cartoon, cinema, art history.

www.design-hero.com
www.myspace.com/herographics
www.design-hero.com/blog



MAKING OF: 'Facial Expressions in Stupidus'

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Introduction

I've always been a big fan of comic books.

In comics anything is possible. Comics are full of funny and interesting characters with awesome facial expressions.



Fig1. Sketches Inspired by comic books

So I got the idea of making my comic hero in 3d, of course in Blender 3d.

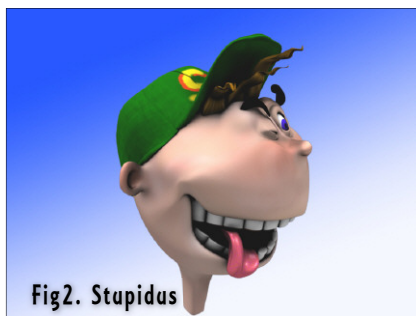


Fig2. Stupidus

I wanted Stupidus, my hero, to be a mix of many of those characters.

Modeling

Because we are talking about facial expressions, let's concentrate only on the modeling of the head. Like Igor Kriankovskij wrote in the last edition of BlenderArt magazine (nm.14): "It's good to start your model in the center of the 3D space, especially if you'll use Mirror Modifiers, Armatures, etc. So first hit [SHIFT+C] to move the 3D cursor to the center, and then [NumPad1] for the Front view (so that the "X" axis goes from left to right)."

I agree with him. Thanks Igor.

I started with a simple Cube mesh in the center of the view, subdivided once and erased one half of the polygons in Edit mode. Then I tweaked some vertices and subdivided once more to get more geometry to work with. I added some edgeloops where the mouth and nose will be, ending up with something like you see in fig 03.

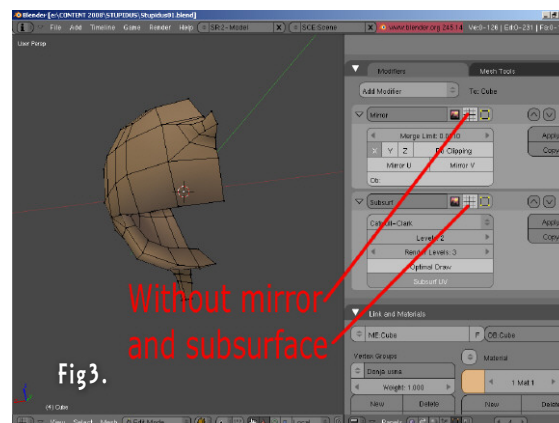


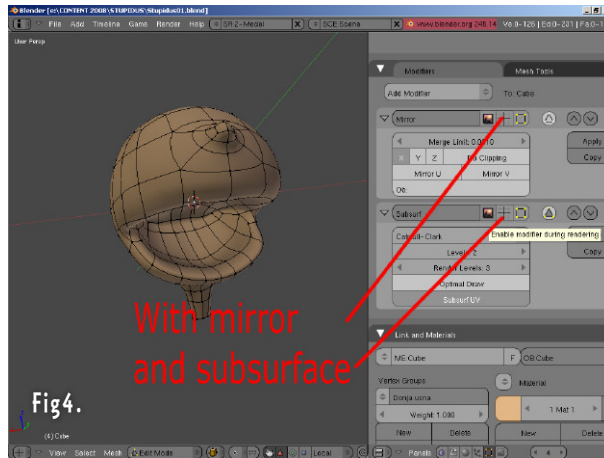
Fig3.

by Dalibor Garic

MAKING OF: 'Facial Expressions in Stupidus'

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After that I set the Mirror and Subsurf modifiers on, and now the mesh looks like image fig 04.



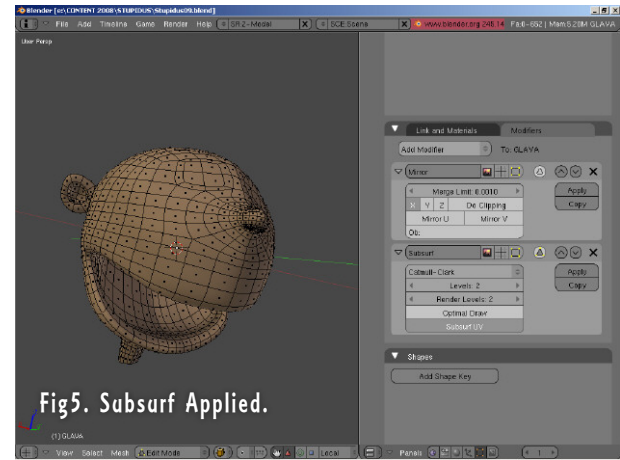
Now you can work on just one half of head while still being able to see the whole "picture"

Important:

In order to make good facial expressions, your mesh must have a good polygon flow or clean edgeloops, otherwise when it is time to deform the mesh the problem areas will be obvious.

After tweaking edgeloops to suit to my mesh properly I apply a subsurf modifier on level 1 to get some more geometry (like subdivide but better). Then I add a new subsurf modifier to see a smooth model.

I add loops where the eyes should be and with a couple Extrude actions, I model some ears.



For all other parts, I continue to model using the same process until I finish the head. After you are finished modeling you should apply the Mirror modifier to remove the object from the modifier stack.



by Dalibor Garic

MAKING OF: 'Facial Expressions in Stupidus'

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Materials aren't anything unusual. I UV unwrapped the meshes and painted color textures in Blender with Blenders Paint tool. For complicated textures I would probably use Gimp but for these color textures Blenders paint tool was just as good.



Fig7. Texture Paint

Shape Keys and Lattice

To build expressions on the face I used combination of Shape keys and the Lattice modifier. My way of working is to model complete expressions on the whole face in one Shape Key. You might think that wasn't a good idea when you have to animate those Shape keys later. But you can separate other Shape keys from that one using Vertex Groups on that same Shape key.

For instance you can model a Shape key with both eyes closed, mouth closed ...etc, in one single Shape key. Then you assign a Vertex Group for Eye_Left and Eye_Right, MouthV-Group, BrowesVertexGroup ...etc. Now you can put the name

of the Vertex Group in the VGroup field of a Shape key. Now your Shape key deforms only the region of the named vertex group.

Using this method, you can quickly build many Shape keys

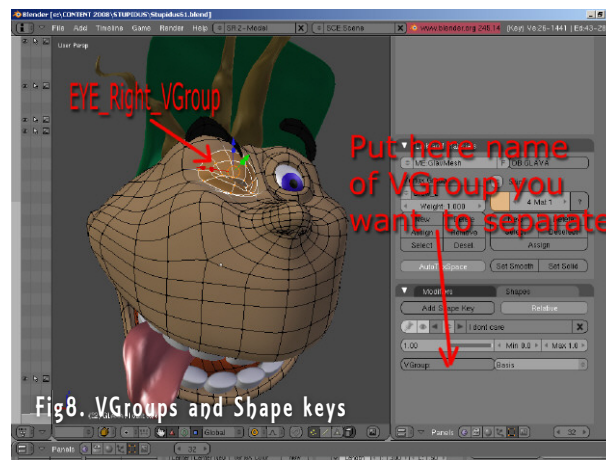


Fig8. VGroups and Shape keys

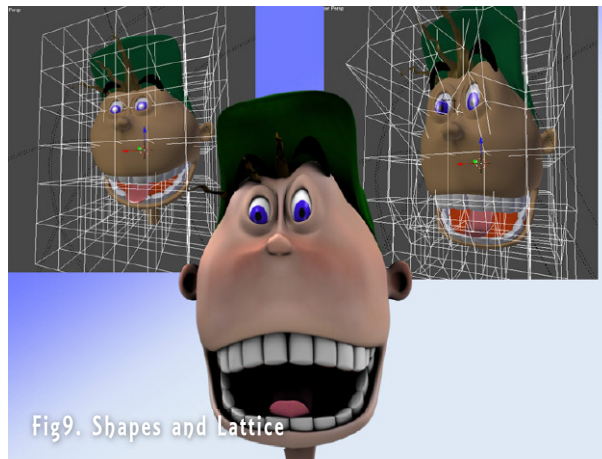
from one key instead of building just that one. Later you can tweak those separated Shape keys as you like to get the emotions you want to express.

Another good way to create facial expressions is to combine already finished Shape keys with the Lattice deformer (or Mesh deformer in some of the new Blender builds from graphical.org -- thanks boys, great work!!!).

by Dalibor Garic

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On the next shot I animate deforming a cartoony head combining both Shape keys and a Lattice.



And another interesting expression is something like "What the heck?":



Good luck and happy blending everyone!

Dalibor Garic

daliborgaric@gmail.com

by Dalibor Garic



by Riste Sekuloski

Introduction

In this article, I'll try to cover the creation of my Einsteindwarf character from the idea to the ready for animation, final character. I don't consider myself a great modeler (or anything great, for that matter), but I'll try to cover as much of my creation process as I can and (much more importantly in my humble opinion) to point to the resources that I have used that have made it possible.

I have made an effort to make the tutorial about the action constraints which is (IMHO) rarely used but very powerful Blender feature.

Also, I'll make Einsteindwarf available to the community (without the textures, if you don't mind). Along with it I'll bundle some of the actions that I have used in the tutorial and explain how you can use its rig for your own characters. I have gone to great lengths to make a rig that is easily adaptable to most humanoid characters (I have managed to do it in less than a hour).

So please, bear with me.

My history with Blender

I have learned how to use Blender out of stubbornness.

I don't know how my experience with Blender compares with anyone else's. I had seen Blender for the first time years ago (probably when it first became open source). It came with a Magazine that I was subscribed to, which always had nice shareware and freeware selections on its CD's. I had always had a good time trying out different freeware programs (I am writing this using Open Office

and I do most of my texturing using The Gimp) and I had to give it a try. I had some previous experience with 3D and I thought that I could easily find my way. Oh, how I was wrong! I mean, who in the right mind would select objects with the right mouse button? I have pressed different buttons here and there, managed to render the default cube, added a sphere somewhere on the screen (previously I clicked wildly across the screen with the left mouse button) and that was about it... I was quite sure that I couldn't make anything in Blender – the interface was so different, so I let it go...

During the next few years I saw numerous great looking still images that had the name “Blender” attached to them, but those were stills, and I was sure that anyone fanatical enough can do a still image that looks fantastic on any program. It just takes a lot of tweaking.

And then came project orange. Someone on one of the art forums that I am a frequent reader of, mentioned that a bunch of wackos made a 12 minute movie using some free 3D app. I downloaded “Elephants dream” (I opted for a mid-quality download, which took a while) and watched it... and again... and again... and it was not only because I didn't understand a thing that happened (I mean, who did?) but because of unbelievable visuals! Details, details, details, meshes of amazing complexity, backgrounds and characters that were absolutely comparable with any professional production and some really great animation! A

nd all of that done in a restricted time frame and by six guys? And with Blender? That thing that I couldn't move a cube in? Give me a break!

I have decided that it couldn't hurt if I give it a try, so I downloaded Blender again and again it hurt... not being able to actually do anything was a humiliating experience... but now I had additional motivation and I made a search for documentation.

"Blender noob to pro" made a lot of difference – suddenly I understood how things moved around and with the "tab" key I was able to finally edit my cube. And edit I did! Compared to any app that I have tried, Blender has the fastest modeling pipeline. It compares favorably with anything out there. Second thing that got me going was the Character animation tutorial from the "Blender summer of documentation". It contains everything to get one started in the right direction. So I followed instructions and I made my version of the gray guy. As a learning experience I decided to UV unwrap the guy. Boy, that was an experience by itself! I have read about them, but one cannot know how amazing the Blender UV unwrapping tools are until you have true hands-on experience. All of the sudden an operation that is comparable to dental extraction without anaesthetics turns into pleasure! I have even made several UV setups, to try for the best. Anyone who has done any UV unwrapping anywhere happily declares it finished whenever it feels "good". But in Blender I had the urge to make it Good with capital G.

Einsteindwarf: the idea

After that I decided that I was ready to try to model and rig my own character. In my humble experience, the surest way to get discouraged in any 3D endeavor is to try to make a model of a realistic human being first! So I smartly opted against it, I looked through bunch of my drawings and I came up with this:

Comment: This is a drawing first made on paper, scanned,



inked and colored digitally (if there is digital color, it is only logical to have digital ink ;-))

This little guy has some feeling about him that I wanted to try to replicate in 3D. I have decided up front that I'll go with more a realistic version of the character and then modify it to a more cartoony version. So, I went on and drew another, more realistic sketch.

I cannot emphasize enough the importance of previous sketches of the character before trying to actually model it. I haven't used any rotoscopes for the modeling for one simple reason: I had no idea how it could be done, but I knew that I can make it work, because I had pretty good idea how the character would look.



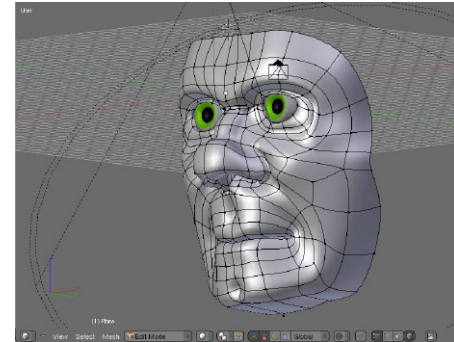
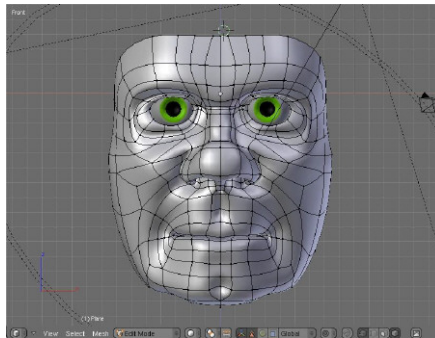
NOTE: Not that I am world's greatest expert on the matter, but I feel that anyone who is at all serious about any 3D has to have at least better than average 2D skills. There are several reasons for that:

- 1 Whatever you make in 3D, unless it is Computer Aided Design ends up as flat art.
- 2 Knowing drawing reduces the time of making a good pose by a factor of ten. And good poses are what makes 3D animation "read".
- 3 You have to make 3D model of the object in your head before you'll be able to transfer it into drawing. After that, transferring it into 3D object is much easier.

- 4 Anyone can draw! By some lucky chance I found a bunch of my drawings from the time when I decided that I am going to be an artist. I remember, I was thirteen at the time and I had such a lovely memory of my first attempts... until I saw them again three years ago. They were beyond terrible! So, if I learned, anyone can learn to draw. Off of the top of my head, I can recommend two amazing resources: "Drawing on the right side of the brain" (can't remember the author), and "Fun with the pencil" by Andrew Loomis. Second book is years (probably decades) out of print but it can be easily be googled... and it is fun! It contains the shortest and the best course to learn the basics of drawing and have great time in the process!

One other thing that I found this drawing useful for, is that it tells something about the character's personality and his feelings. And animation is all about the feeling! It also made me think about the story behind it and it helped me come up with the idea for a short animation with this character.

Einsteindwarf: the modeling



Comment: Those are wireframe screenshots made very early in the modeling process. Although I am fanatical about saving my incremental file versions, this is probably my first saved version of the model. That is how fast modeling in Blender is!

First of all: "Better face tutorial" at "Blenderartists" forum and "Adrienne" facial modeling video: they are an absolute must, they contain everything which is important and they are free! Watching the video and reading the thread will save you a lot of grief later. There are also a number of other tutorials that will teach you about the importance of the loops and making the mesh deformable for animation. Look no further than the Blender documentation and the "Blenderartists" forum. Of course, BlenderArt magazine is cool too ;-)

About the modeling process that I used: I have started with a subdivided plane, I erased half of it, used a mirror modifier, a subsurf modifier with optimal draw turned on and that would be it! The rest of the modeling process is made with basic extrusions (E key), selecting four vertices (Ctrl + left mouse button) and making faces (F key). An alternative for making faces is: when in edge selection mode, select two opposite edges and press F – it saves two mouse clicks.

NOTE

There are some incredible material libraries made available by Good Blender Samaritans. They can save you a lot of grief while texturing. There is one danger in them, though: one can start rendering material by material to see how cool it looks and forget what was the reason for looking for the library!

by Riste Sekuloski

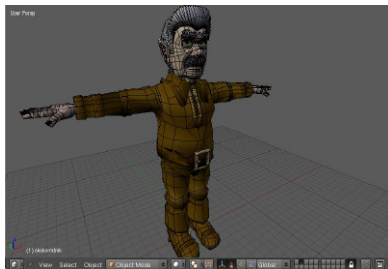
I have used the knife tool several times (select faces mode: Ctrl + tab, 3 key then selecting the actual faces with the brush selection tool (B + B), pressing K key, drawing the cut with the left mouse button and pressing Enter. That would be it! Uh, and a looooooot of vertex pushing.

I have decided to model the hair and the mustaches for two reasons: I found that particle hair is relatively complex to master and modeled hair renders much faster. Ironically though, the hair and the mustaches are the most complex parts of the model. They contain as many vertices as the rest of the model.

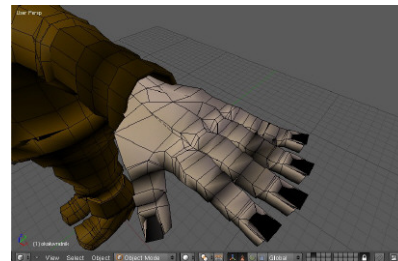
(When I finished the face, hair and mustaches, I noticed that the finished character has an uncanny similarity with my father's face. Very strange and unexpected indeed. But, the subconscious works in mysterious ways. Of course, my father does not have those pointy ears.)

Modeling of the body was a variation of the modeling of the gray guy's body from the "Blender summer of documentation", of course with increased complexity to suit my character.

Comment: Finished mesh with superimposed wireframe. Note the number of vertices in the hair and mustaches! Also



note the terrible topology of the hand mesh! Some modeling purists might critique the elegance of the mesh, but I haven't seen any rendering troubles with it and that is what counts in the end!



Materials:

I have to admit I have no idea about materials in Blender! I don't know how they are made from the various types of noise, I have just the faintest idea what the shaders are about, I have to make an enormous number of experiments to make color ramps work, so I opted for the obvious choice: I used materials from "Elephants dream" as a starting point and I adapted them for my needs (adapting means that I changed a maximum of one or two settings). But I know how to use image textures and that should suffice!



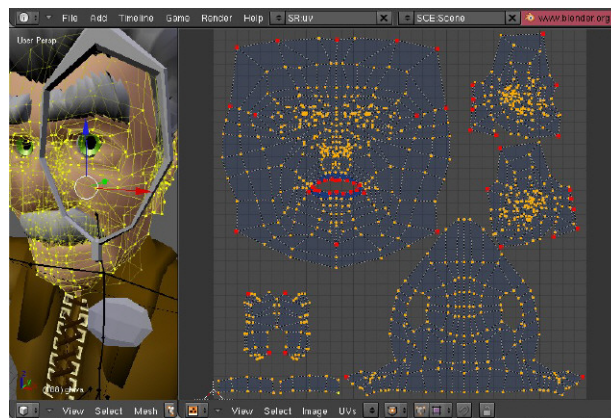
Comment: Rendering before texturing. The mesh has only materials which have been donated by Blenderheads from around the world.

UV unwrapping and texturing:

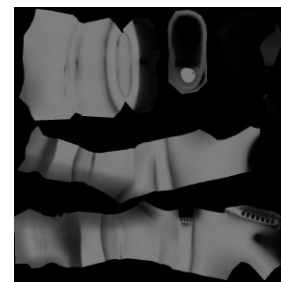
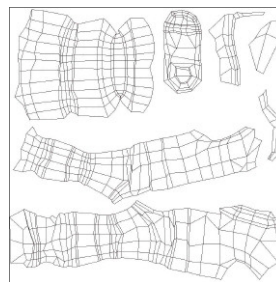
I have decided to make separate UV maps for the face, the hands, body and hair. For the same reason, they are separate meshes. It has been explained in many different places, but I'll repeat the basic procedure:

- 1 In edit mode select the edges that you want to be the seams of the mesh and mark them using Ctrl + E (In edge selection mode with "Occlude background geometry" button pressed)
- 2 Press U in 3D view, select "unwrap" and if you are very lucky, that's it!
- 3 Most of the time, nobody's that lucky so some tweaking is usually required: select parts of the mesh using L (selects connected vertices) in the UV/ Image editor and position them properly using translate and rotate (G and R respectively). In some cases, you'll want to scale up important parts and scale down those that don't require much space (soles of the boots, for example)
- 4 Now comes the fun part: pin the parts of the mesh that you are happy with (P) and then select "Live Unwrap Transform" from the UVs menu: Move some of the pinned vertices and enjoy the magic! You can always pin some more vertices (P) and unpin (select, Alt + P) others. This makes it possible to increase the proportion of the important parts of the face compared to the unimportant ones. Usually unwrapping as it is makes peripheral parts of the face relatively bigger compared to the central (and important) parts: lips, nose, eyes. So this makes it possible to increase their size and make better textures with the right amount of details.
- 5 When you are reasonably happy with the UV map, you can export it as a wireframe (UVs, scripts, Save UV face layout) and go on to painting textures.

- 6 I like to add one more step: I usually make two more maps by baking color (Texture only) and Ambient occlusion maps (Ctrl + Alt + B). I find the Ambient occlusion map especially useful because it contains additional information about the form of the mesh.

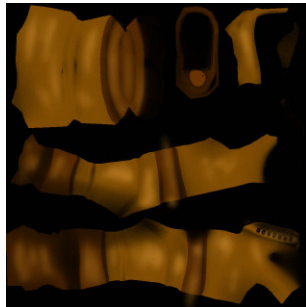


Comment: Note the number of pinned vertices (red)!



Comment: Exported UV map and AO baked rendering make two layers in my painting app! I usually set AO and UV map to multiply over the color map that I am going to paint. Of course, the UV map is made invisible in the final image!

7. Lucky Seven! Painting of the textures is fun! Again, one needs at least some drawing experience to be able to pull it off. I have used the Ambient occlusion map as a base for the Color map because it gives them a realistic "dirty" feeling. You'll notice that my color maps are very simple. That is because I am using bump maps to add necessary realism to my textures.



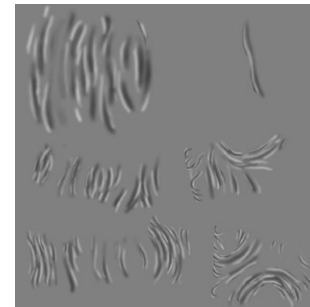
Comment: Final color map for the clothes.

- 8 Bump map! Always remember to start with 50% gray map for the bump maps! That is because 50% gray is "neutral ground" for them. Everything lighter than 50% will stick out and darker will cave in. The thing to remember though is this: Bump maps ("Nor" in Blender-speak) does not change actual geometry and when seen from profile, surfaces will be seen for what they are: flat! An alternative for this is to use displacement maps, which I did for the clothes, but I have noticed that the displacement modifier slows down animation considerably, and after some experimentation I found out that using a bump map for the clothes looks almost exactly the same, but animates and renders much faster. You'll notice that the facial bump map has a small amount of noise which represent pores of the skin. However, I had to replace the noise with featureless

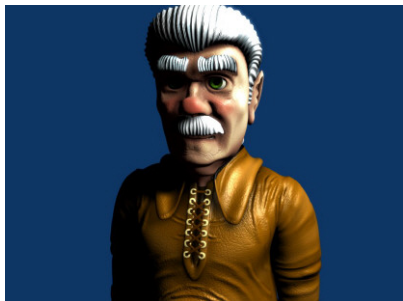
50% gray at some places where the pores are not that visible: nose, cheeks and ears. Facial wrinkles are the coolest to draw. Just remember to use some reference as a basis and then go wild! (I did ;-))



Comment: Facial texture with high specularity, so that wrinkles are more noticeable.



Comment: Initially I have used this map as displacement, but it turned out that it renders much faster as a bump map and looks almost the same! Also, there is another bump map that gives a leathery texture to the model (look for "leather material" at Blenderartist forums)



Comment: Finished, textured character in different lighting conditions.



Comment: Character modification made with rescaling of some parts of the mesh. It was fun!

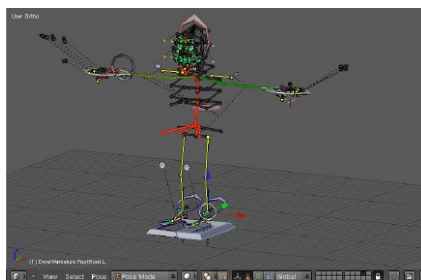
Armature:

Rigging of characters is an art of its own. It is a complicated and long procedure and I guess that is why large companies in the animation industry have Technical Directors to make their rigging. Luckily for me, Blender artists have created several great rigs to analyze and learn from: Bassam Kurdali, Calvin and Jason Pierce were my benefactors here. I have used parts of their rigs to make my Frankenstein Monster rig that I am using. Of course, I had to experiment and make changes on my own here and there (and those are probably the worst parts of the rig ;-).

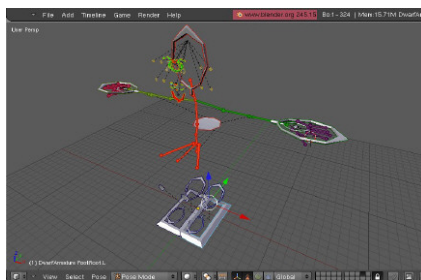
I have to say that Calvin's facial rig was a true revelation! It virtually eliminates the need for Shape Keys and gives a great amount of control with a small number of controlling bones. Also, many thanks to Bassam who is the daddy of several enormously important rigging breakthroughs in Blender!

After I managed to compile some sort of useful rig, I had to go to the most dreaded part of the rigging process, and that is the painting of the bone weights. This is the part that took most of the time.

It probably took 50% of all of the time that I spent creating the character. Weight painting is a process that is very prone to mistakes and also the part that requires the most of “trial and error” learning. I had to learn to hide parts of the mesh because it is the easiest thing to accidentally weight paint some distant part of the mesh and wonder for hours why moving the feet causes wild deformations of the head! I shudder to think about it!



Comment: All the bones in EinsteinDwarf armature. Looks scary, huh?



Comment: Luckily, those are controller bones! Not so many of them, and you'll probably use most of them very rarely.

Action constraints:

Although I was pretty happy with the level of control that the final rig provided I wasn't that happy with the need to move at least six bones to make a smile, for example (eight if you count in cheek controls that I added for better facial expressions). Also, a simple blink takes moving four bones and that is additionally complicated if one wants to make an offset blink (a blink in which one eye closes and opens slightly faster than the other). Not to mention the making of a fist: it takes moving and scaling of at least five bones and they have to be positioned very carefully or they will not look natural.

After some experimenting, I have found that action constraints may be the answer to this problem. They are pretty easy to set up and I'll go into them at length, for the reason that I haven't seen a tutorial that properly explains their use.

Facial expressions:

- 1 I have set up 8 control bones on the sides of the head (children of head bone) that I have used for control of the facial expressions. I have set up all the controller bones for the facial expressions on the bone layer 8.



MAKING OF: 'Einstein Dwarf'

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by Riste Sekuloski

- 1 In pose mode, the setup looks like this (NOTE: bone objects for controller bones do look familiar ;-) - I have copied them from Calvin's "Bob" facial rig)



- 2 Set up your actions:

- Make sure all the bones are in their rest position (pose mode, select all (A), press Alt + G, Alt + R, Alt + S)
 - Make a New action (take care not to duplicate an existing action, but make a new empty action). Name the action. (Use a short descriptive name because you'll have to type it again later)
- c Go to frame the when the action ends (I have used frame 11, but you may make the action longer or shorter), pose bones (don't worry if you go overboard with the expression – it will make posing more flexible later) and key all the bones that were posed.



I have named this action "mwide" - Mouth Wide

- d Return to frame 1 and delete the link to the action datablock (click on the X on the right side of the action name) (NOTE: You don't have to return to frame 1, but you'll have to return the bones to their rest positions – you'll save time this way and start from the step 2)
 - e Repeat for all the actions you plan to use (Don't worry if you miss some action, you can come to this again later)
- 6 Decide how to connect various expressions with control bones: For example, I have decided that the first bone on the left side of the face will control opened, closed, wide and puckered mouth poses. (NOTE: note the movements of the bone and changes in the expression. Also note that Transform Orientation of the controller bone is set to "Normal".)



- 7 Start setting action constraints:
 - a Select your favorite bone – you'll going to use it to set all your action constraints – I prefer a bone on the left side of the mouth, but that is just me.
 - b Add Constraint – Actions
 - c Fill in the fields:

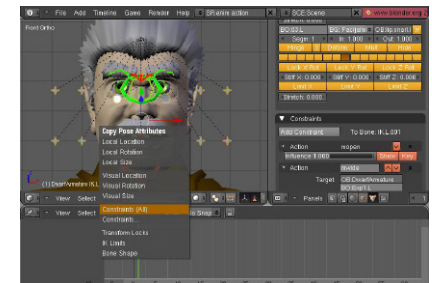


- 1 Target: Name of the armature (DwarfArmature),
- 2 BO: name of the controller bone (Exp1.L),
- 3 AC: name of the action (mwide, in this case)
- 4 Start and End (starting and ending frames of the action)
- 5 Loc X: means that X location of the controller bone controls this action. (You can see the axes of the controller bone from the "Transform Orientation" of the bone if it is set to "Normal".)
- 6 Min, Max – movements of the controller bone (in Blender units) that switch between frame 1 and 11 (In this case it means that frame 1 is at the rest position of the bone and 11 is 0.25 Blender units to the right) – you

can use negative values (for the pucker pose, which is opposite of the wide mouth pose).



- 4 Repeat this for all the actions: I had 8 mouth actions and two controller bones and it took me about 20 minutes
- 5 Now comes the tricky part (save the model first)
- 6 Select one by one all the bones that have been used in some of the facial expressions. Leave the bone with action constraints to be the last one selected (NOTE: You can also select the bones that were used in some of the expressions, but were not used in others – it doesn't really matter. Just don't select toes or other non – facial bones, and of course, don't select expression controller bones that were used to control action constraints)
- 7 Press Ctrl + C, select Copy Constraints (All)



- 8 That's all – you may try moving controller bones to see if everything is right!
- If things don't move your way, make the necessary changes at the first bone and then repeat copy constraints – it will overwrite old ones with the new setup.
- It is very easy to make a mistake and overwrite constraints of the constrained bone with the empty one – that's why it is absolutely necessary to save the model before copying of the constraints.
- 9 9.You may or may not (depending of the preference) want to add Limit Location constraint to the controller bone (as seen in images (action constraints 004.jpg – 007)) – but it makes it much easier if you do.

I've done my best to try to explain the process as simply as possible. I hope that this makes sense. If not, feel free to devour the model and find out how it works.

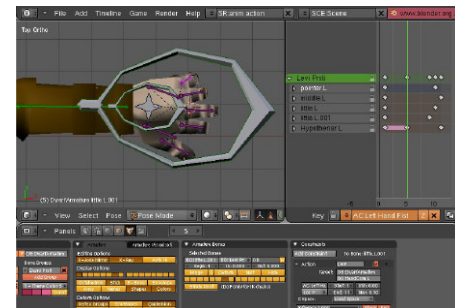
An additional benefit of this setup is this: You may sum the movement of two actions: opened and wide mouth for example: (action constraints 011.jpg). Or you can go wild and use two controller bones and mix four expressions: open, wide, smile, show teeth!.



Hand movement:

Now I am going to describe another important aspect of Action Constraints: Try and make fist with your hand: unless you are making conscious effort to make it otherwise, your fingers move at different rates: usually you flex your pinkie first, then your ring finger... thumb comes last. Also, fingers are lightly flexed in the rest position – and again, little finger is mostly flexed ... etc.

If you take a look at the action “Left hand fist”, (action constraints 013.jpg), you'll notice that all fingers are keyed at



frame 1 and that only the middle finger is keyed at frame 11. Other fingers are keyed depending on the speed at which they flex when making the fist. (By the way: Hypothenar is the fleshy mound on the palm of the hand above the pinkie. The- nar is, as you may have guessed already – the fleshy mound above the thumb). This makes it possible to make the fist when the controller bone for this action constraint is moved to the end of the range, but makes the hand rest position when you move it slightly.

I'll just add that the hand controller bone is in the middle of the hand and it controls spreading and flexing of the fingers

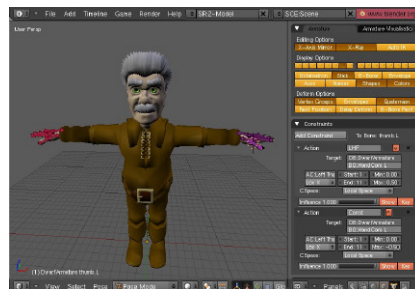
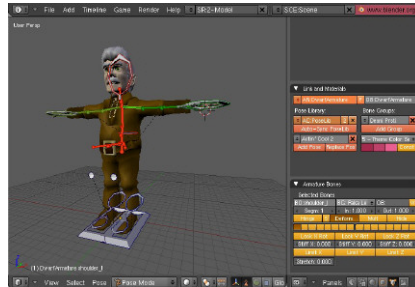
Bone layers:

Bone layers to remember:

Bone layer 1: Body pose controls.

Bone layer 7: Individual finger controls (and Thenar and Hypothenar controls) – it is most probable that this layer will stay unused, unless you need really subtle hand movements.

Bone layer 8: Facial controls.



Armature part two:

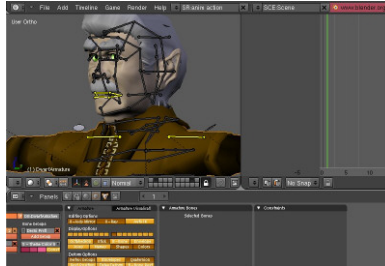
After going through all this I was still not happy with the bone weights. I felt that they can be improved upon, but it was so hard!

Comment: My first experiment with Bone Heat bone weighting! Scary!



And then, Brecht came up with the Creating Bone Vertex Groups From Bone Heat. Why then and not a year earlier? I've tried this option with simple models and it worked great. Happily, I tried it with Einstein Dwarf and it looked terrible! Whenever I moved any bone he just went all over the place! Why? Of course, the solution was simple: after some head banging at the wall I realized that all of the bones were Deform bones. So, I took my time to look through every single bone and make the decision if it deforms the mesh or controls other bones.

After finishing that process I gave it another try: I removed the parent of the head mesh, selected it, selected the armature, pressed Ctrl + P, Selected: Armature, Selected: Create Vertex Groups From Bone Heat and voila! I had perfectly weighted facial bones in three seconds! It went the same with the body. So, the process that took me ten or so full workdays was now finished in less than a minute. Of course, sometimes the mesh deformed strangely – for example, rotating of the neck also caused movement of the back of the head and parts of the jaw, so I had to add a few more deform bones which were used to stop the mesh from unnecessary movements. (they prevent “bone heat” from the distant bones)



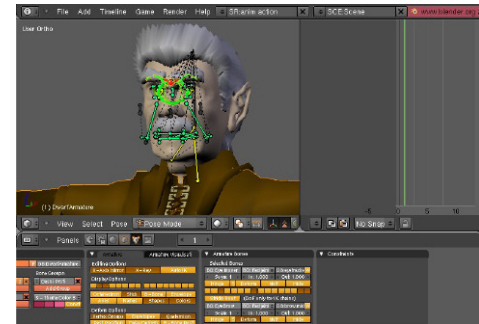
Gray bones (Bone layer 9) are such (preventing) bones. Depending on their location, they are children of head bone, jaw bone and thorax (Spine4) bones. This may look complicated, but all of this took less than 20 minutes to setup.

Armature part three (Dwarf Armature to you):

Creating Vertex Groups from Bone Heat has one cool side effect:

- 1 Open your humanoid mesh. (no armature, please)
- 2 Import (Shift + F1), Object, DwarfArmature
- 3 Append, don't link!
- 4 Select the armature, enter edit mode, make all of the bone layers visible.
- 5 Select X - axis mirror of the armature and edit the armature to suite your mesh, following those simple rules:
 - Legs have to be vertical
 - Hands need to be horizontal
 - Facial bones should be inside the head mesh

- Try to avoid resizing of the facial bones, especially of the mouth bones, but this is not an imperative. If you do so, maybe you'll need to modify the actions with facial expressions. Also, in that case, you'll probably need to Change the Rest Length of the bones that have a "Stretch to" constraint applied to them (some of the green bones on bone layers 2 and 3.



- Try to make lips bones accommodate the form of the mouth area of the mesh as close as possible.
- Eye bones need to have the origin in the middle of the eyeball
- 6 6.Make the armature parent to the mesh selecting bone heat option.
- 7 7.That's it!

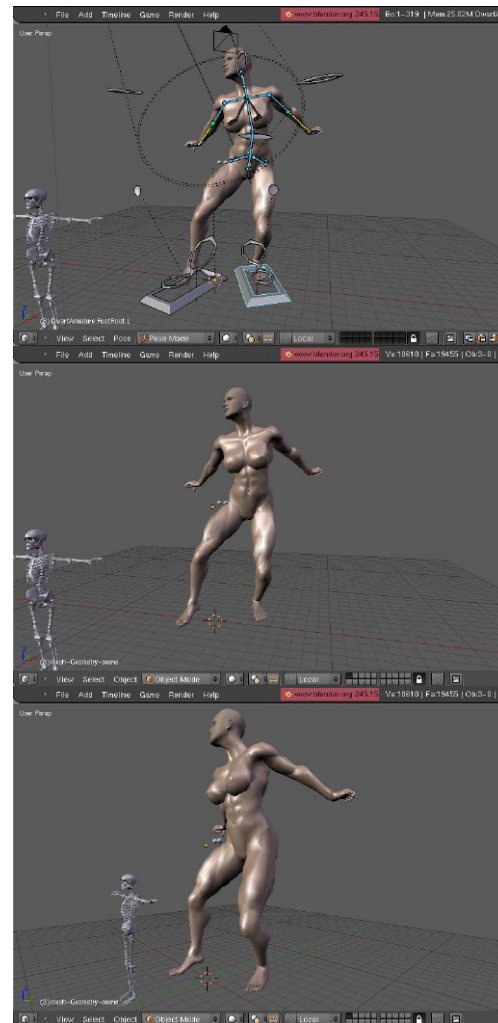
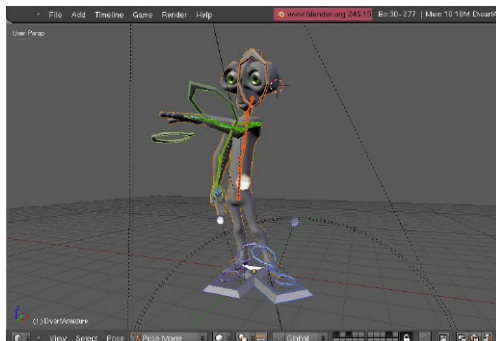
NOTE: You may need to add or erase some of the "preventing" bones. You'll need to do this if you notice funny deformations during the testing. This all may sound complicated, but I have accommodated DwarfArmature for several meshes and it always took me less than an hour (including the testing). In one case, everything was done within 20 minutes.

MAKING OF: 'Einstein Dwarf'

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NOTE 2: I found that the easiest way is to select all the bones, move and scale them as necessary, then to deselect the bones that I am happy with (Key B (as in select), then deselect the bones with key Alt depressed)

Here are three very different examples: Two characters with funny body proportions and one anatomically correct character created with "Makehuman". It is important to say that poses are from the shared pose library created with EinsteinDwarf.



by Riste Sekuloski

Animation:

I have noticed a funny thing: most of the aspiring animators stay at the rigging phase. I have to say that I am (or hopefully was) one of them. For example, when I found out that this rig can be applied to various different characters with minimal modifications I went and I rigged those three characters, and a few more – some of them already had excellent rigs, then I went on and imported my characters from my previous 3D app – Animation: Master, and of course, they needed to be reworked... Also I felt that I could make much better meshes for the controller bones... and then I realized that I am running away from the thing that I actually need to do: Animating. I am afraid that many of the 3D artists continue to make better and better models, they improve their texturing, they make better rigs... and for what? So that they can animate "one day". Because of this, I have decided not to use particle grass, not to texture my backgrounds, but to make the scene as simple and as soon as possible and to start animating, which I did! This is my character's habitat and I hope that I'll have some quality animation to show very soon!

NOTE: I am actually very new to actual animation, especially in Blender, but I have found three amazing animation resources:

"Disney Animation – an Illusion of Life" by Frank



Thomas and Ollie Johnson, "Animators survival toolkit" by Richard Williams and "Lightwave 3D [8] Character Animation" by Timothy Albee. The first two books are well known classics, but the latter is an amazing book that I stumbled upon accidentally: I don't have Lightwave, but I found it secondhand and it was so cheap that I couldn't resist (I am weak to all the things 3D). The second part of the book is treasure chest filled with explanations, exercises and challenges. If you look at the EinsteinDwarf you'll probably recognize some of the poses in the pose library from the book. This book has educated me and motivated me immensely and I cannot recommend it enough.

Comment: One of the exercise poses modified for my character.

Last words:

This has been a very long article. It actually took some three months to finish. I hope that you survived it to the end and that you'll not need three months to read it! I have tried to cover some of my thoughts and experiences while creating this character, I have also tried to make a small tutorial of one of the Blender features that is not used very often but which I find very useful. I hope that you'll like the character that I am sharing with you (please don't use the mesh for commercial purposes and credit me if you use it for non-commercial ones). Please inform me if you use the rig for your own characters and send me a copy if you improve upon it!

Happy Blending!

Riste Sekuloski

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<http://www.ristesekuloski.blogspot.com/>





Introduction

"A Reflection on Blender being introduced to Industrial Design students."

Although Blender is mainly known for CG character design and animation, it also provides valuable tools for the field

of Industrial Design. Those assets include modeling, rendering, and animation. For the last 2 semesters I have been teaching Blender at the Kendall College of Art and Design of Ferris State University. The software is being used as a complementary program in CAD, along with Rhino.

Blender was introduced to the Digital Modeling class because T-Splines released their Subdivided Surface to NURBS Surface converter for Rhino, which enables both the student and designer to utilize polygon mesh modeling with subdivided surfaces to explore and design very organic products - in particular, those which would be difficult or very time consuming with a raw NURBS-based approach. NURBS, while having their benefits, are not always the easiest

and fastest tools to work with, depending on the desired surface.

Blender was presented to the students in various smaller modules to build up understanding of the software and to explore the creative capabilities of polygon mesh modeling. Blender's interface is indeed a very often discussed topic. The menu structure is not always consistent, and compared to Rhino does not have a very simplified or centralized approach to tools. This in particular makes it very easy for new students to learn Rhino. Yet, a fact often overlooked is the complexity of Blender.

However, I have to say that after presenting Blender's interface in small steps and guiding the students through it, they quite successfully mastered a strong initial learning curve. The initial excitement about the software was often followed by a time of frustration and feeling confused by all the new tools - however the moment they grasped the concept, they became secure and more proficient with the software step-by-step.

Blender currently has a growing, professional web presentation and the online documentation is continually being revised and updated. This is very often helpful to students when they search for additional information. The lack of Industrial Design tutorials is indeed a shortcoming -

however Blender's true nature is not in this area - and the modeling aspect is what I cover during my classes.

Including Blender in the classroom was not only intended as a help to provide students with an alternative approach to surfacing and utilizing T-Splines, but also as an introduction to a solid modeling and rendering application. This in particular was done with the long-term goal to establish Blender in this field as an alternative to commonly used commercial solutions.

My hope is for students, infused with new uncommon knowledge, gain a sufficient level of proficiency so as to be able to present their understanding of a modern, application-independent workflow to their future workplaces - and establish their skills with Rhino and Blender as a valid, professional and less expensive alternative. The idea is to refresh the opinion about what is a standard in the industry - to educate students to a level that they can use knowledge from the academic environment to shape the business world.

3ds Max is very common in the Industrial Design field for product rendering here in the USA. However, what is very often not stated is that the products are rarely rendered with the internal renderer. The software is mainly used to setup the scene for

by Claas Eicke Kubnen

stills and motion pictures, and the rendering is then passed on to other commercial render engines such as V-Ray or finalRender. This means that two commercial software programs are being used, and required to be purchased.

This is where the rendering and animation capabilities of Blender come in. Students can explore rendering of products utilizing Blender's various possibilities. This includes standard light rigs (with Spot, Area, Hemi lights, etc.), utilizing the new Approximate Ambient Occlusion (AAO), and evaluating the somewhat dated Vertex Color-based Radiosity solution. The Radiosity solver is still very useful for illuminating the environment a product is placed within, while three-key, six-key, two area light and AAO combinations are very useful for illuminating a product that does not have a relationship to the background.

Today Blender can simulate a wide range of different materials like brushed metal surfaces, complete with blurred, stretched highlights and reflections. Also, materials such as silicon and realistic wood can be achieved along with different processes such as sand blasting and embossing utilizing bump maps. The material mixer allows multi-layered surfaces like car paint to be used, or surfaces like brushed metal with a specific stretched highlight, including the sharp specular reflection of

a clear coat applied on top of the metal surface.

The Displacement modifier enables student to simulate imperfections in the model, like those giving handmade clay work their natural aesthetic. Particularly useful is that the displacement can even be baked into the actual geometry for further manufacturing, being not only a visual element.

The Render Layer and Compositor node system allows all major post-production jobs to be done right inside Blender. Shadow, diffuse, highlight, texture and other passes can be saved as separate files to enable the designer to quickly fix render problems in the individual passes or enhance, as a post process, the channels instead of affecting the complete image.

The Compositor nodes are very useful when a light rig is set up and the artist would like to explore different light setups in terms of color and energy without re-rendering each time. Lights are being rendered to separate layers and then mixed together in the compositor.

After only one semester, it is impressive how well a few students can master Blender for their work and include it in other classes as well. The renderings still have the nature of a beginner's quality - they just started - however I see a positive progression since students like the software and enjoy working with it and learning it on

their own after class. As with all complex software, everything takes time.

A few students have given Blender a test drive in a professional work environment and are currently utilizing it as an accepted tool addition to their workflow, after presenting the possibilities of Blender to the design team. Those projects range from simple product rendering to actual product design.

At "Attwood Marine," Zachary Lownds is doing his product renderings of imported CAD models for the company's product catalog, through which they are advertising their service to new customers.

William Oltman and Ross Hirdes use Blender for both rendering and design. Ross very much enjoys quickly exploring different model variations through placing them on different layers. For a chair series he was working on, he got the previously created steel frame from a CAD file. Inside Blender he modeled the missing body around those constructions. This included bent plywood elements, plastic molded parts, as well as the upholstery and fabric selection. Through T-Splines he had no problems with bringing back work done in Blender into any other CAD software for further refinement and manufacturing.

The usage of Subdivided Surfaces changed their modeling abilities significantly, enhancing the formal language they are utilizing. For Ross, many ideas are first explored quickly

in Blender due to the more flexible nature of mesh modeling compared to NURBS patches, while he performs graphical explorations through rendering his products.

Zachary is learning rendering with Blender just this semester, while Ross and William used it in the Digital Modeling class last semester. This means that after spending one semester with it, it was enough to grasp the concept and apply it to the work field on a professional level.

In the area of product animation Blender supplies the user with a rich set of tools to get the job done well. In this nature renderings are usually less realistic, and thus less time consuming approaches are favored.

The new Material Baking solution can be used with Ambient Occlusion to speed up simple camera rotations. The special effects tools for fluids and particles are more than a product animator needs for most of the visualizations needed. Fluid flow inside an engine, mechanical movements, and many other tasks are easy to setup and animate inside Blender.

However, commercial software solutions like V-Ray or finalRender are very strong competitors, especially with their Global Illumination capabilities, which area is one of the biggest shortcomings in Blender.

Depending on the product and material to simulate, Blender can do the job very well. However, compared to commercial renderers, the results achievable within Blender for animation do not yet always perform as well as they do for very realistic still renderings.

Ambient Occlusion is a good tool, but is not always the answer to each render problem. AO is global, not local, and this limits its usage depending on the scene. However in those situations, software such as YafRay or Yaf(a)Ray, Indigo, and LuxRender, among others, are strong complementary tools to round out the rendering tool set.

Yet there is already somebody working on it; Matt Ebb is exploring Image-Based Lighting (IBL) options for AO as well as very amazing looking gradient-based anisotropic reflections . . . so let's stay tuned.

With the recent Particle, Material and Node additions to Blender, it would be very nice to have those render features built into Blender to have color bleeding, IBL, as well as caustics.

A simple one step bounce would be sufficient enough for many tasks to get a nearly real rendering output and promote Blender as a competitive and mature professional tool, able to be used on every project and render task.

Integration into the Business World:

Very often, many design studios have an established workflow, and changing the software they use is not easy a task as one might think. Sometimes software selection can be influenced by the used plug-ins or product libraries only available for a particular package. This is quite common with AutoCAD for example. Changing a working pipeline can have risks and setbacks which are problematic for a company's productivity. In addition, you also have to count in the amount of time required to train the designers for that software while they remain productive in the projects they work on.

This is quite a challenge for companies to deal with. As they say, "Time is Money." And what they primarily need is security and quality output.

Smaller design companies have it much easier. They can more quickly evaluate new software or techniques and adapt much faster to changes. This is where I see the biggest initial growth for Blender in professional product design and related fields.

Those are also places where my students have already brought in Blender. I hope that when they graduate and apply for positions at bigger firms that they can include their knowledge

there. Their portfolio will hopefully be filled with convincing renderings and animations. They could function as the visual proof that Blender, as free and open-source software, can do the job right.

If one person knows Blender very well, they can also act as the main in-house training person. This is a very important factor simply because of the complexity of Blender's tool set and the flexibility of the interface; understanding the software when learning it on your own has an initial learning curve that can be quite high.

At an academic workplace, the person responsible for evaluating new software solutions may have a maximum of three to four hours to look into those packages. Most realize that this amount of time is not enough to learn and understand Blender when being completely new to it.

Very often, one licensed copy of any software is not enough. Multiple seats have to be purchased. 3ds Max, Maya or Alias Studio are quite expensive solutions. 3ds Max also requires additional render engines at extra cost. A single-seat license can quickly reach up to \$5000 (US). In that case, a company needs to be able to use the software to its fullest potential to justify that initial financial investment.

Software solutions such as hyperShot, which offer fast and easy rendering tools, cost a fraction of those prices

and are very easy to learn. However they have no animation tools and offer only limited scene setup possibilities. With Blender we have no cost, a higher learning curve, but many more tools compared to some cost, a low learning curve, but with fewer tools.

Many job applications list 3ds Max as a preferred render engine, and knowing the software of course would be beneficial. Of course, in the end all that counts is the rendered image, which in my opinion comes from a person's skill.

However, as I mentioned before, the students understand Blender quite well after having been guided through it. I am convinced that when this happens with an in-house person, the same could be possible at a design company. Everyone loves to save money, and why not get good results at the same time?

What the student now needs to learn, is to be strong enough and bring that weapon to the battlefield. The majority of job applications ask for 3ds Max, while in Industrial Design rendering is only a minor aspect; the major part is product design.

I can hardly imagine that a company would not hire a student who has good Product Design skills but does not know the render software.

A point many students do not see is that skills learned in Blender can be

transferred into other applications. Blender also offers a free solution and thus no pirated software has to be secretly used to produce outstanding renderings for their portfolio. In addition, 3ds Max might be dominant in the USA, but there is also Maya and Alias.

Moreover, in Europe Cinema4D is a very popular product. There are trial versions for each package now, and the student can familiarize themselves with those options, depending on what the job asks for.

But somebody who is serious about CG would do that anyway - out of curiosity.

Examples of student work:



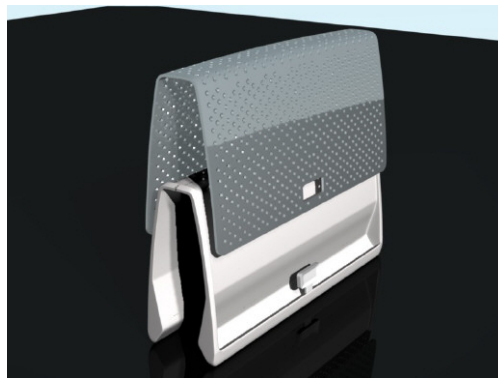
Zachary Lownds - LED Lamp :: Modeled in CAD - Rendered in Blender with Area Lamp / AAO



Ross Hirdes - Chef Chair Upholstery Study :: Modeled in Blender - Rendered in Blender with AO



Ross Hirdes - Wand :: Modeled in Rhino - Rendered in Blender



Ross Hirdes - Dish Rag :: Initially Modeled in Blender | Holes Modeled in Rhino - Rendered in Blender

by Claas Eicke Kuhnen







G33K
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- Make sure that screenshots are clear and readable and the renders should be at least 800px, but not more than 1600px at maximum.
- Sequential naming of images like, image 001.png... etc.
- Text should be in either ODT, DOC, TXT or HTML.
- Archive them using 7zip or RAR or less preferably zip.

3. Please include the following in your email:

- Name: This can be your full name or blenderartist avatar.
- Photograph: As PNG and maximum width of 256Px. (Only if submitting the article for the first time)
- About yourself: Max 25 words .
- Website: (optional)

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